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Program in West Pakistan
Lahore, Dec. 1967

SVINTH, C.A. - Strengthening Agricultural Extension in West Pakistan - 1955-70
Lahore, Nov. 1965

Lahore,
February, 1968.

THE AGRICULTURAL REVOLUTION IN WEST PAKISTAN
----- ITS HUMAN SIDE

the role of the Department of Agriculture
in dynamic change in the Agricultural System of West Pakistan

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S U M M A R Y

The Agricultural Revolution in West Pakistan --- Its Human Side
a REPORT by George H. Axinn.

The farmers of West Pakistan are awake!

The Department of agriculture has played a key role in this awakening.

Over the years the Department has continued to modify its policies and procedures to improve the effectiveness of the extension service, agriculture colleges, and research institutions. This evolution is commendable. Today, however, a dynamic and effervescent agriculture is crying out for a further "revolution" in the public agencies which serve it.

As those who till the soil and manage the farms evolve drastically from peasants into scientific businessmen, the demand for an increasing quantity and quality of information flowing to them will compel the Department of Agriculture to become even more efficient, and hence, more effective.

Although the Department is presently providing excellent service in many ways, if it does not change itself in concert with its changing clientele, it will rapidly become obsolete. To overcome this, recommendations in this report are designed to provide a highly motivated, well-trained staff which further contributes to the growth of the agriculture of West Pakistan.

Some of the recommendations included in this report can be implemented within the present regulations. Others may require changes in the rules. Those which are useful and can be implemented within the rules should be taken up as soon as possible. Many of the recommendations require no increase in finances. Others require additional expenditure and may have to be delayed until finances become available. Some of the recommendations can be done quickly and the pay off

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should be immediate. Others will require a long time for implementation and to achieve concrete results.

As with all reports of this nature, certain recommendations are more important than others. The ones which appear to be important and will pay large dividends are as follows:

- (i) A Training Cell is recommended within the Department of Agriculture in a staff position to focus attention to the problems of in-service and pre-service training. This recommendation is coupled with one for Training Specialists attached to the Directors of Agriculture, and for Extension Specialists attached to the Research Institutes. The Training Cell should also coordinate a system of staff development and training which plans the professional growth of each individual within the service.
- (ii) Several recommendations are advanced concerning changes in the conditions of service which will provide for the field staff of the Department, the kinds of incentives which motivated the revolution among the agricultural producers. These include suggestions for increasing opportunities for promotion, special bonuses based on the performance, increasing training based on need and merit and more effective supervision and evaluation based on performance.
- (iii) A third group of recommendations deal with strengthening the already effective Bureau of Agricultural Information. Stressing the principles of communications theory, this report recommends the establishment of a Media Planning Cell within the BAI to develop a strategy for the best use of all the channels of communication within and between the Department, its various sections and their respective publics, be they farmers, business-men, policy makers or other.

- (iv) The report recommends an Operations Research Evaluation Cell in the office of the Secretary of Agriculture. This unit could examine the relative effectiveness of the various methods and techniques being used within the Department, and offer information and guidance to the administration for policy changes to improve performance. A list of suggested research projects on specific problems is included.

Certain of the recommendations will, of necessity take some time to implement and measurable results will be slower to achieve. The report, however, recommends that pilot projects be started and evaluated. Two important recommendations of this kind are:

- (i) The establishment of local farmer training centers, to encompass the offices of the agricultural staff, land for demonstrations and offices for supporting supply services; and
- (ii) The provision of agricultural training in the first five years of elementary schools perhaps with the Field Assistants and Agricultural Assistants participating in the school program.

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ABOUT THE AUTHOR:

Dr. George H. Axinn has been involved in agricultural extension education, in many parts of the U.S.A. and in several other countries, for more than twenty years. He has lived and worked on a farm, carried on local agricultural extension work, written farm stories for newspapers and magazines, and produced farm radio and television programs, edited agricultural research publications, trained extension personnel in program planning, evaluation, and communication techniques, administered an agricultural extension service, taught at university and post-graduate level, served in the central administration of an African university, and conducted field research among rural people in several parts of the world.

After receiving his B.S. degree in agriculture from Cornell University, he served that institution's Agricultural Experiment Station as Editorial Assistant. From there he went to the University of Maryland to edit all agricultural publications, and later to the University of Delaware as Agricultural Editor and Chairman of the Department of Rural Communication. At Michigan State University, where he is Professor of Agriculture, he has served as Extension Television Editor, Director of the Communication Training Unit, Director of the Institute for Extension Personnel Development, and Associate Director of the Cooperative Agricultural Extension Service.

Dr. Axinn received his M.S. degree in Agricultural Journalism and the Ph.D. degree in Administration and Rural Sociology, both from the University of Wisconsin.

Since 1961 Dr. Axinn has been responsible for his university's efforts to assist in the development of the University of Nigeria, and he has been resident there for much of the time. In addition, he has, from 1964 to the present, served as Assistant Dean of International Programs at Michigan State University.

The author of many articles and research papers, mostly in the field of communication, agricultural extension, administration and rural sociology, Dr. Axinn is a member of several scientific and professional societies. He has advised on problems of agricultural extension and trained agricultural extension personnel in Canada, Nigeria, Jamaica, Taiwan, and fourteen different states in the U.S.A.

His consultation in Pakistan during January and February of 1968 at the request of the Secretary of Agriculture was sponsored by the Ford Foundation.

I. INTRODUCTION - The Human Side of Agriculture

A large zamindar in the Sind expressed pleasure over the new varieties of seed he was using, and also the fertilizer. He told me how much progress Pakistan was making in increasing production. But he was concerned about the future. He mentioned other countries in the world where agriculture was scientific, efficient, and highly productive, and asked me to name the secret ingredient which made the difference.

"The secret ingredients," I replied, "are research and agricultural extension/education."

New varieties of high producing seed, large quantities of chemical fertilizer, massive adjustments in water supply, insect and disease control, adequate production credit, government support of prices --- these are the inputs which are usually listed as necessary for high productivity in the agricultural sector.

But these ingredients, no matter how effective their supply to agricultural producers, cannot transform a peasant agriculture into a highly efficient business enterprise which provides food and fiber not only for those engaged in it, but also for tens of thousands of others who are not on the land --- who are freed from it to serve in industrial, commercial, educational, and public service.

These ingredients alone cannot bring to a nation a modern agriculture in which it can take pride, and where those engaged in it are the most proud.

The additional inputs --- the crucial inputs which convert the farmer from peasant to scientific business manager, which convert the nation from food deficit to food exporter, and which brings dignity to farm life --- these inputs are research and education.

Future generations of the people of Pakistan will point to the present period as the era in which dignity came to agriculture, and in which bountiful harvests transformed the nation to a role of leadership in the modern world. This is to the eternal credit of those who serve agriculture in government ... for it is they who planned the transformation, and it is through their good effort that it is coming about.

At the invitation of the Secretary of Agriculture of West Pakistan, and with support from the Ford Foundation, I was asked to come here for a brief visit to look into the problems of in-service training within the agricultural extension service, and other aspects of agricultural extension in the Province as well, and to advise on future activity.

The Minister of Agriculture for West Pakistan, Malik Khuda Bakhsh Bucha, in presenting me with a charge for my assignment in West Pakistan, asked that I look into various aspects of extension work in the Agriculture Department, and then be "frank" in my report, as he had been with me. In addition, he expressed concern not only for the technical knowledge of field personnel, but also for the "souls" of these men. --- He asked me to look into ways of creating the urge and the spirit which would motivate them --- help them see the significance of their work, and feel the joy of doing it well.

Three weeks is too short a time for an assignment such as this. Six months would probably prove inadequate. Fortunately, predecessors such as C.A. Svinth¹ and D.F. Davy² have investigated some of the same issues, and their excellent reports have been a significant resource. Also, many officers of the Agriculture Department and other units of government in Lahore and elsewhere in West Pakistan have been most generous with their time, and they, along with dozens of farmers and a small group of Ford Foundation and USAID staff, have also contributed much to my information. But as a scholar, I am

amp led to state that all of my observations, conclusions, and recommendations must be considered as merely tentative. They are based on insufficient evidence collected under unrepresentative conditions by a hurried observer. If they trigger an interest, more thorough investigation should be carried out, and those with longer experience in grappling with the issues as they are found in West Pakistan should modify what I have said.

For the Minister, the Secretary of Agriculture, and other senior officials of the government, however, I have found a story in the Punjab which is probably well known to them. For me it suggests an answer to the questions which were raised.

An old farmer was approaching the end of his years. He gathered his many sons around him, and they discussed the affairs of the day. Gradually the old farmer guided the discussion around to the problem of farming. "What kind of manure," he asked them, "is best for making crops productive?"

One son said that cattle manure was best. Another suggested a compost. A third said that poultry manure was strongest.

They discussed other alternatives as well, but none seemed to satisfy the old farmer. Finally one son spoke up and said let it be known that none of them was right. The best manure," he observed from the wisdom of his years "is the dust which comes off the feet of the master."

II. SITUATION -

The farmers of West Pakistan are awake!

From Campbellpur to Thatta; from Digr to Lala Misa

From three-acre tenant to three-hundred-acre landlord from small holder to absentee landlord.....

The farmers of West Pakistan are awake!

They visit the agricultural research institutes, pressing for new information. They listen regularly to farm broadcasts on the radio. They read the daily newspapers, the agricultural papers and all kinds of booklets and pamphlets that find a friend or a neighbor or a school. They seek financial assistance and agricultural advisers after draining them of all they know about the business of farming.

Technical words like Mex-pak, triple phosphate, J-1, Irr-pak, fertilizer and modern trade flow freely from the mouths of farmers whose mother words are Urdu, Sindhi, or Urdu or Pashto and from others whose English was learned at Oxford or Davis. They now know the market prices and follow a working policy for the future.

Whether the Agriculture of West Pakistan has reached the so-called "take-off" stage, or is merely on the threshold of "take-off" surely the "agricultural revolution" is in process. The wheat yields of the present Rabi season provide living testimony. Not only have farmers changed to new varieties of wheat at various in appropriate proportions, but they are also expanding acreage, and apply chemical fertilizers in quantities which, while below some of the recommendations appear to be larger than anything seen before.

New maize practices provide another example. A year ago when it became obvious that there would not be sufficient seed of the new J-1 maize to meet

production goals for Kharif planting, maize technologists suggested to agriculture department officials that a special crop be planted in February so that seed could be produced for sowing in July. Some officials were cool to the proposal, since it represented a departure from the usual practice, and its probability of success had not been demonstrated in the previous year. They agreed, however, to allow a qualified maize research expert to address farmers on the radio and seek their cooperation. The response was overwhelming, special training was carried on for agriculture department staff and growers, and 150 muhads of seed were planted by over 2000 growers on 7000 acres of land. As a result over 500,000 acres were planted with improved seed in July.

A large land holder in Lahore told of his aroused interest in agriculture. Many of his relatives had begun to personally supervise the operations of their acreages, and because nothing else features in their conversations, he too had been drawn in. Farming had become a significant income producing business enterprise, and it had become obvious to him that he could no longer afford to follow traditional absentee landlord practices.

And a tenant who farms two and a half acres far from the paved road, and who was not acquainted with government agricultural officers, had planted Mexijan wheat this year. Why? Because his zamindar had told him, and all the other tenants, that they had to, and had supplied the seed and the ammonium nitrate and triple phosphate. This man is applying less than recommended quantities of fertilizer ... but larger quantities than he had ever in his life used before.

Thus a new awakening and a new spirit have taken root in the agriculturists of West Pakistan. And its infectious nature has begun to spread among the ranks of those who supply the farmer with his inputs, as well as those who buy his products, those who try to educate him, and those who study the processes of agriculture, learning how to make them more efficient.

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As this "agricultural revolution" gains momentum, the pressure on the other sectors of the agricultural system which will be brought to bear by the production sector (the farmer) will increase tremendously.

Growers will not be content to wait for insecticides while they water their crops watered by virus like borers. Cultivators will not be content with Field Assistants who cannot answer technical questions. Zamindars will not be satisfied with out-of-date or incomplete information about an ever-increasing range of new varieties and complex cultural practices.

In fact the progress in technology inevitably results in an increase in the sheer volume of information which could flow among the various components of the agricultural system. And as the system "modernises", the demand for a increasing quantity and quality of flow of information through it. It's extension and education units to become more efficient and hence, more effective.

For example, the knowledge which is required by a grower to switch to Muzrai wheat is relatively simple. It relates to the set of quantities of two kinds of chemical fertilizer, spread over two or three applications; and the price of fertilizer at the expected market price.

But as additional short-stemmed, high producing varieties are introduced, it will be necessary to afford increased strain resistance against rust, the information flow will increase exponentially. If each of five varieties, for example, had its own best growing dates, its own best depth and plant spacing, and its own best fertilizer quantity and analysis --- the amount of information which first-line workers in agricultural extension might be expected to deliver to their clientele would multiply by five.

And if at the same time, heavier investments in fertilizer lead to increased soil testing, and the requirement to tailor-make each recommendation to the particular soil type on which a particular variety is to be grown, the capacity and the fidelity of the communication between grower and

extension war, between extension man and researcher, and among others in the system increases geometrically.

Further, as production of raisins for export has increased during the Five-Year Plan period meets and exceeds the domestic consumption requirements the impetus for expansion of raisin agriculture is strong. Even now, the production levels expected with J.I. Rais and improved strains are promising potential for expansion of West Pakistan's poultry industry. But the extent of research required to backstop a modern poultry industry, with the bearing of complex facilities against diseases, and pest control, is far greater than while taking into account poultry diseases, strains, and other factors, is beyond the apparent capacity of present units.

It is the synergistic effort of agricultural extension with a close observation suggests, is required for a parallel "revival" of the private and the public agencies and organizations will serve it.

Although a complete description of all aspects of the agricultural system of West Pakistan is beyond the scope of this report and the competence of its author, a general analysis seems appropriate to provide a background for discussion of the problems and opportunities of agricultural extension.

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III. THE AGRICULTURAL SYSTEM OF WEST PAKISTAN.

Any agricultural system -- in a District, Division, Province or nation -- can be said to have five major components.

These are:

- Production - the holders of the soil and the operations of farming operations, along with the activities of irrigation, are a part.
- Supply - the individuals, organizations and agencies which supply the production component with inputs such as seed, fertilizer, pesticides, and the provision of other financial arrangements which make it possible for supplies to flow.
- Marketing - the individuals, organizations and agencies which receive from the production component the products, and either store, transport, process or otherwise, consumes it.
- Research - the component which studies the operations of the first three along with possible alternative operations, and generates new knowledge which will be useful to the system.
- Education/Extension - the component which trains personnel for all other components, and usually also expedites the flow of information among the other components.

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These five components are related to each other through ter clusters of channels, or linkages, which are illustrated in Figure 1. Also, each component has linkages with outside systems. Each linkage has a certain capacity for carrying information and goods, and, from the standpoint of information, each has its own fidelity and memory.

Scholars concerned with development of agriculture are turning, more and more, to systematic models such as this, since they offer a practical approach to highly complex situations, and tend to prevent investigations from overlooking crucial variables.

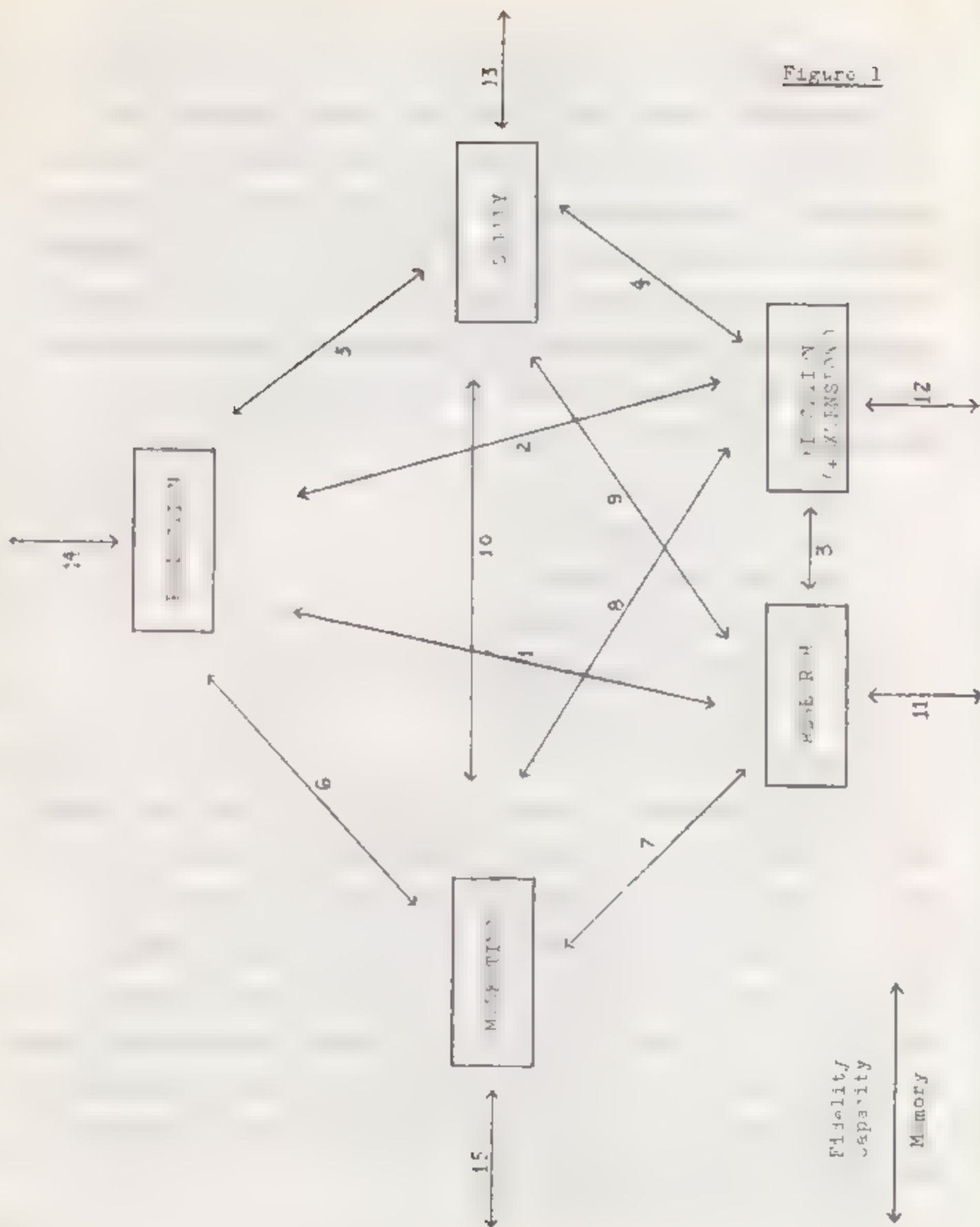
Usually, a change in any component or linkage of such a system affects the entire system. This is reflected above in the pressure which will be put on both the research and the education/extension components by the 'awakening' in the production component.

Similarly, changes in the amount of information coming from the research component, say from a new variety which has been introduced, place new stress on the linkages between that component and all the others, and also on the linkage between the education/extension component and the production component.

Such a system may be likened to the agricultural situation in a Union Council area, or in a Tehsil, or a District, or Region, or Province. Each system has sub-systems within it, and supra-systems of which it is a part. Also, each component may be looked at as a system, made up, in turn, of sub-components and linkages.

To avoid confusion, it is essential to focus on only one level of analysis at a time, and to concentrate on relationships --- on efficiency and effectiveness --- at that level only.

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Report of Dr. George H. Axinn, February 1968.

A critical glance at the agricultural system in West Pakistan reveals that many of its aspects are efficient and effective, and are serving well in the achievement of desired ends. For example, the linkage between the production component and the research component (number 1 in Figure 1) appears to be quite functional. In many other countries of the world this is a weak link. Research workers do not know what problems face farmers, and do not care, and farmers know nothing of the results of agricultural research. But brief visits to the research institutes at Tarnab, Lyallpur and Tandojam suggest that these institutions:

- are visited often by farmers,
- welcome farmers when they come,
- have field days for farmers,
- put on demonstrations for farmers,
- prepare popular leaflets (published by BAI) for farmers,
- give radio talks for farmers,
- visit from time to time on farms.

This is impressive, and suggests that a variety of channels of communication are being used to carry messages both ways through this linkage (from farmer to research institute, and from research institute to farmer).

Many places within the extension service I also observed examples of effective linkages worthy of credit and commendation. However the purpose of this report is not to applaud that which is satisfactory, although there is much, but rather to identify that which can be improved. It is also to anticipate the effects which present changes in certain components of the system will have upon other components, and to suggest adjustments.

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* One recommendation, which precedes all others, is that there is need for systematic operations research with respect to all of the linkages in figure 1, and such investigation can pay great dividends to those in government responsible for the entire agricultural sector. The more you know about the fidelity and the capacity (the extent to which various kinds of messages flow in both directions) of each of these links, the better the decisions can be made regarding operations within the system. The work of the author during the past three weeks is but a flash of lightening in the darkness, illuminating briefly what is there. Much more light is needed.

IV. RECOMMENDATIONS

Since the primary charge given to me had to do with the staff of the Agriculture Department in its extension function, my major recommendations relate to the Education/Extension component of the system. This component, however, contains many other units engaged in agricultural extension and agricultural education, in addition to the Agriculture Department. Among them are the Agricultural Colleges, private technical companies, Basic Democracies, the Agricultural Development Corporation, the Land and Water Development Board, the Home Department, and others.

Further investigation into the linkages among these sub-components would provide additional insights into the nature of the entire system, and would have practical usefulness to the Ministry of Agriculture.

The Minister's charge (see page 2) indicated focus on the training of field staff, the use and, and the motivation of this staff on the other. Therefore, recommendations below relate to each of these, and are followed by recommendations regarding the major linkage of concern to the Agriculture Department, the link between the Education/Extension component and the Production component (see page 1).

Further recommendations are suggested for other aspects of the system for whatever use they may be to readers.

The major recommendations should be considered as long-range suggestions, perhaps to be implemented during the Fifth Five-Year Plan. However, some parts of them may be possible in the immediate future, and these are marked with a star (asterisk).

A- The Education/Extension Component.

A highly motivated well-trained staff will indeed be essential if the Agriculture Department (major operating unit in this component) is to keep up with the "agricultural revolution" in West Pakistan.

Rapidly increasing quantities of information will challenge its present procedures, and the quickening pace of change in that information will strain its capacity. For a component whose basic function is gathering of information and passing it on to those who can use it, the need for in-service training for all levels of officers can be expected to increase greatly in the years ahead.

But investments in training of a staff who are not motivated to use what they learn are a waste!

Without failing to appreciate those dedicated individuals whose heart and soul are in their work, and who comprehend the dramatic significance of this work, and therefore find joy in its excellent performance, the Minister certainly put his finger on the heart of the matter when he called attention to the need to strengthen motivation among the field staff. As one outstanding Pakistani agriculturist put it, 'Our field workers are not missionaries, but employees.'

Ways and means of building increased motivation into this group are suggested in the following:

Recommendation 1 - Conditions of Service

Several adjustments are suggested within the Class IV and Class III groups of career officers.

The present Field Assistant cadre has little opportunity for advancement in rank or prestige and there is practically no turnover in the group. Some of the following may be possible:

- * 1.1 - Conduct a vigorous evaluation of personnel performance at the end of the first year of service, and confirm, by the end of the second year, only those persons who show promise of professional growth and development in over two decades of further service (approximately 50%)
- * 1.2 - Provide scholarships for approximately 20% of persons in the latter category, after four to six years of service, which

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will support the work of the universities offering a B.S. degree in agriculture or in the technical agriculture courses now being planned for the universities.

1.1.1 Coordinate the curriculum of the Training Institutes for these officers with the universities, so that the degree may be completed in one year less than normally required.

1.2.2 Selection for these scholarships should be made on the basis of outstanding performance as judged by superior officers, and documented by them for final selection at the time of the Secretary of Agriculture.

1.3. Divide Class IV into three sub-categories Junior, Intermediate and Senior - so that Field Assistants will strive towards promotion on the basis of merit of performance, as well as seniority increments. A scheme is further proposed whereby annual increments for intermediate officers in this class would be Rs.10 above Junior officers and Senior Officers would be Rs.15 above Intermediate Officers.

1.4 - Award annual increments to approximately 4% of personnel in this group each year on the basis of merit of performance as judged by superior officers.

1.5 - Award double increments to approximately 10% of personnel in this group each year on the basis of the merit of their performance as judged by superior officers.

1.6 - Award a certificate of merit ending on 1st January to one field assistant in each district annually, based on the merit of performance at year. The awards to be made at an appropriate

ceremony, presented by the Minister of Agriculture, and accompanied by a cash award (Rs. 1000).

- * 1.7. - Award a certificate of superior service to one field assistant in each region annually, under conditions similar to those in 1.6. above, and accompanied by a larger cash award Rs. 500.
- 1.8. - For the Agricultural Assistants (Class III), similar arrangements should be made. Instead of four-year scholarships, they should be for a shorter period, and intended to assist in the attainment of the M.Sc. degree.
- 1.9. - A similar, but modified, program is also indicated for more senior officers.
- 1.10. - Tenure of post needs to be longer ... while it is true that to shift officers in other departments from time to time, on a three-year basis, it does not provide sufficient time for field agricultural worker to be one acquainted with and known to his farmer clientele, as well as local soil, water, and growing conditions, and does not allow local people to build up sufficient confidence in him that he can become really effective. Where a man is doing a first rate job in agricultural extension, he should be allowed to remain in one location for up to ten years.
- 1.11. - There should be more possibility of career development for agricultural officers in which they spend some years in extension, some years in research, and go back and forth before coming to posts where they may spend full time in research.
- 1.12. - Consider some identifying clothing for Field Assistants ... perhaps a green and white scarf with the Agriculture Ministry seal on it for cold weather, and a white shirt with seal on pocket for warm weather This would serve as morale builder as publicity;

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and for easy identification after transfer to a new area.

1.13 - The evaluations of personnel performance will not be possible without more intensified supervision at all levels. Although this evaluation should be continuous, at least once each year every officer should complete the appropriate proforma which is provided for this purpose for all those directly responsible to him. These should be reviewed with the individual concerned at the same time the individual's in-service training plan is being revised, so that appropriate training can be indicated for every weakness which is documented.

* 1.14 - In this regard, the 12 days of touring indicated in the present plan is insufficient. All officers, from Director of Agriculture to Agricultural Assistant should spend a minimum of two-thirds of their days each month in visitations, in the field, with personnel of the next lower echelon. Wherever possible, team touring is indicated. That is, D.D.A.s should team up with E.A.D.A.s in visiting each of their A.A.s, and E.A.D.A.s. should team up with A.A.s in visiting each of their F.A.s.

The best manure is indeed, the dust which comes from the feet of the master.

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However well intentioned and highly motivated the field staff may be, without professional competence and timely accurate technical information, they will do the system more harm than good. Therefore, the following are suggested with respect to in-service training:

Recommendation 2 - In Service Training

- 2.1 - The Agriculture Department needs a training unit, but I do not believe that it is either necessary or appropriate to set up in-service training institutes, with their own staffs, buildings, and facilities.
- 2.2 - Instead, I would recommend that a training cell be established as a staff office to the Secretary of Agriculture, with a Class I Officer as Director of Training and not more than two additional Class II officers. This cell would have responsibility for seeing to it that regular programs of in-service training are planned and carried out for an officer of the entire department, that the quality of these is as high as possible; and that they are optimally integrated with research plans and targets of the department.
- 2.3 - Three additional persons, designated as training specialists (Class II officers) would be affiliated with the central cell but actually attached to the three Directors of Agriculture. Each Director of Agriculture would have one of these specialists resident at his headquarters, and available to stimulate and coordinate in-service training efforts within the region.
- * 2.4 - The actual venue of most in-service training would be the research institutes, although some would take place at the agricultural colleges. Teaching would be done largely by research personnel, supplemented by college staff where appropriate, and integrated by extension specialists for each major crop who would be resident at the research institutes. (They could be part-time research and part-time extension, particularly at higher levels). There should eventually be one extension specialist for each major crop (or group of crops), and such areas as agricultural

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marketing, farm management, and farm mechanization at the center in Lahore.

- 2.6 Presently existing facilities at some of the research institutes are adequate for this purpose. In some cases better facilities would have to be built. But space at the colleges, the Academy for Rural Development at Peshawar, and some of the present Training Institutes should also be used.
- 2.7 - Each extension specialist would have responsibility for intensive training of certain agricultural assistants in his own field of specialization, for some training of the entire staff in that field, and for keeping the entire staff informed on a continuous basis of new developments within that field (see recommendation of agricultural field sheets and field worker booklet below).
- 2.7 For each major crop, a two-week training program should be carried out once a year at the main research institute dealing with that crop. The program should emphasize practical field operations in which each participant actually does, with his own hands, all of the major operations involved in the production of that crop. The IRRI rice training program can provide a model for these sessions, and has already been followed at the Shaikhan and Indri rice research stations and is being planned for maize at Yousafwala.
- 2.8 - Each agricultural assistant would participate in one of these two-week in-service training programs each year, rotating among the crops which are most important in his area, and including crops in areas to which he may be transferred (see recommendation on transfers, number 1.10)

- * 2.9 - In addition, at least one agricultural assistant in each district would specialize in each major crop of that district. These men also attend a one-week refresher course on the crop annually.
- * 2.10 - Throughout the training effort, the fundamental concept of each trainee doing with his own hands all that he is to learn about should be emphasized. In the rice training program, as it was successfully carried on at Kala Shar Kaku last year, each trainee got into the field and took his turn plowing, and seeding, and transplanting and weeding, and irrigating, and spraying, and harvesting. Only after each man has actually done it can he speak with confidence about the process. This is a basic principle which has been learned many times over by those who would teach scientific agriculture to illiterates. It should be integral in the work of the Training Institutes, the Agricultural Colleges, and all of the in-service training of field personnel of the Agriculture Department.
- 2.11 - The regional training specialists and the staff of the central training cell would have direct responsibility for training in such areas as extension methods, program planning, and rural sociology. In all other areas, they would see to it that appropriate training went on, keep records of activities and achievements, and collaborate with extension specialists in the production fields in facilitating their work.
- 2.12 - One of the two staff members of the central training cell might well be a specialist in instructional media and methods, and he would sit with the training specialist and a specialist in an individual crop, for example, when they are designing the elements of a particular two-week practical course, or a refresher week. He might also provide

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training for Field Assistants and Agricultural Assistants in such subjects as: how to give talks to groups, how to use cinema vans; how to use tape recordings, how to get the most out of posters, etc.,...

- 2.13 - The other might be specialised in general communication, and should provide a liaison with the Agricultural Information Bureau. He might handle, for example, training of Agricultural Assistants and others with regard to the farm radio programs. This could include work on use of the broadcasts in radio forums, how to be interviewed on radio, preparation of radio talks (for research workers and extension specialists), and programming agricultural radio (for those attached to the radio stations).

- 2.14 - In addition, the central training cell would be responsible for induction training of all new officers who join the Department, orienting them to departmental policies and procedures, as well as to programs and objectives. This would be followed up in the regions by the training specialists attached to Directors of Agriculture.

- 2.15 - The assumption here is that the responsibility for in-service training rests with the senior officers of the Department: the Secretary, the Directors, the Deputy Directors, and the Extra Assistant Directors of Agriculture. The Director of Training and training specialists at regional levels would serve in a 'staff' capacity to enable these officers to fulfil their training responsibility.

- 2.16 - Fundamentally, a part of the responsibility of each officer in the system would be to see to it that every junior individual who reports directly to him has a training plan for his own individual professional growth and development, and that at least some steps in this plan are

achieved each year.

- 2.17 - The plans themselves might include not only participation in the two-week, and shorter training programs organized within the department, but also reading, pursuit of advanced degrees, both within Pakistan and outside, participation in the programs such as those of the Administrative Staff College, the National Institute for Public Administration, and the Academy for Rural Development.
- 2.18 A loose-leaf type handbook should be developed for all field officers of the Agriculture Department. Individual one-page fact sheets should be prepared by research personnel and others as new information, recommendations, varieties, etc., become available. These should be edited and published and distributed by the Bureau of Agriculture. Information to all holders of the book, (AAs, FAs, RAAs, etc.). As a change is made in a recommendation, a revised sheet is prepared and substituted for the old sheet in the book. The book can have sections for administrative regulations etc., as well as agricultural technology. This handbook would become a continuous part of the in-service training program for field staff. As a beginning, most of the material in the present handbook for Field Assistants should be reproduced on loose-leaf sheets, and made available in permanent, high quality binders which will withstand the wear of daily field use.
- 2.19 - In-service training, of course, builds upon a foundation acquired during pre-service training. The adequacy of the agricultural colleges, with respect to Agricultural Assistants, and the training institutes, with respect to Field Assistants, cannot be evaluated in this document.
- Mr. Dorsey F. Davy of the Ford Foundation has made recent recommendations

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in regard to the Institutes and these are supported. However, one observation appears clear even after the most casual glance. If Directors of Agriculture and Deputy Directors of Agriculture select out the best productive members of their field staff, and assign them to train others at the Institutes, the problems of the future will be magnified. In time of stress, it is unwise to cut down the fruit trees.

- 2.2 - Also, with respect to these Institutes, there is an apparent trend away from the bulk of their students being employed by the Department as Field Assistants. In the future these students will be employed by other organizations, or return to the farm. Consideration should be given to making the Institutes, more and more, after the Folk Schools of Germany, have as their primary goal the training of young farmers.

Recommendation 3 - Training, Research and Evaluation

- 3.1 - An evaluation and operations research cell should be established in the office of the Secretary of Agriculture. It should be a small group of professional social scientists (one Class I director and two Class III assistants) who are independent of all operating departments, but have access to all of them. In addition to processing data from other departments to estimate the extent to which targets are, in fact, achieved, this cell should also measure the relative effectiveness of various methods and techniques being used, and thus provide valuable information and guidance to the administration and the in-service training division. For a detailed list of projects suggested as examples which such a unit could profitably undertake, see below. If insufficient funds are available to set up a separate unit for this purpose during

the Fourth Five-Year Plan period, then perhaps one Class II officer with this purpose should be a part of the training cell.

3.2 - Projects suggested for consideration:

3.2.1 - Communications patterns among farmers of West Pakistan.

This would be a survey of which media are being used by various classes of farm operators (tenants, small holders, middle size owners, large zamindars) in various locations throughout the Province to receive and send various kinds of messages.

3.2.2 - Comparative effectiveness of extension methods.

This would be an experimental study of a variety of techniques which are being used or might be used to bring on extension education, in which the impact of each is weighed against the cost of each.

3.2.3 - Career Patterns of Agriculture Department Personnel.

This study would analyze numbers of years of service for officers of the field staff, including prior training and experience, frequency of transfers, patterns of salary change, resignations, and retirement.

3.2.4 - What happens to graduates of

- a) Agricultural Institutes
- b) Agricultural Colleges

This study would analyze placement of persons completing courses at each of these institutions, and the career patterns which follow. One phase would deal only with recent graduates. A later study could go further back in history.

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3.2.4 - Crop reporting.

This would be an evaluation of the validity and reliability of present methods by means of which data are assembled to estimate a range planned to various crops, as well as yields from those a review of the present situation.

3.2. Program evaluation.

This would be an independent survey of the extent to which various parts of the program of a particular area (possibly district level) are in fact, being met. It would be carried out in different parts of the Province from time to time, and the results will be compared with reports from the various reporting channels.

3.2. Personnel Performance Evaluation.

This study would attempt to distinguish between performance characteristics of field officers who are highly productive and those who are less productive as an effort to develop performance evaluation which can be used by officers at various levels to fulfill their supervisory duties.

3.2. Systemwide Communication Analysis.

This would be a study of the capacity, fidelity, and memory of the various major linkages in the agricultural system of West Pakistan.

Recommendations - General

Before leaving the discussion of the Education/Extension Component there are a few miscellaneous observations which may be of value.

- 4.1 - Of the five functions analyzed the Department of Agriculture eventually should probably have only research and extension functions, with the

supply function moving first to A.D.C. and finally entirely to private firms and cooperatives.

- 4.2 - There seems to be a general consensus among senior officers that the plant protection supply and equipment should be radically moved out of the Agriculture Department and into the private sector. Here and there individual farmers and commercial firms (and possibly A.D.C.) are getting into this work. Although I support this shift, a word of caution is indicated. As farmers have less and less reason to rely on Field Assistants or Agricultural Assistants, because they no longer supply seed, or fertilizer, and soon pesticides these field officers will have to be able to substitute for these tangible goods intangible knowledge and information. To the extent that the information is practical, useful, timely and accurate it will strengthen the position of the field officers. At the same time as the private sector takes over more or less and less of the functions of the supply component, it will be to its advantage to strengthen its links with the extension (L.A.C. in Figure 1.)

- 4.3 - The Bureau of Agricultural Information seems to be doing an excellent job, as part of the Education/Extension component in facilitating the use of the linkage which connects it to the production component. Channels such as radio, newspapers, exhibits, films, photographs, posters, pamphlets, periodicals, bulletins and books are being creatively and effectively utilized in carrying various messages from both this component and the Research component to farmers.

- 4.3.1 However, there seems to be a lack of planning in terms of the strategy in which these various channels are coordinated in achieving maximum

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impact with minimum cost, and there is also lack of coordination of strategy with the operations of the Agricultural Assistants as they will be expected as the personal visit, the demonstration, the tour, and the meeting. See recommendations for some changes on how to do this at the level.

- 3.2 This suggests that the staff should benefit from a planning and strategy which will be coordinated with the general planning and operations of the secretariat, as well as the in-service training which will be required for the staff and evaluation of the recommended changes in the reports.
- 4.3 - A staff of the planning division of the Bureau have developed a plan for the staff and have also developed a plan for the staff of the Department. It is suggested that the staff should be organized in a way which will be as so far as possible in line with the University of the Pacific or with the Agricultural University of the Philippines. In addition, liaison with the staff of the Bureau is required as if the staff of the Bureau may be as follows.
- 4.4 - In regard to the general plan of the Agricultural Department, the staff of the Bureau should be organized in a way which will be as so far as possible in line with the University of the Pacific or with the Agricultural University of the Philippines. In addition, liaison with the staff of the Bureau is required as if the staff of the Bureau may be as follows.
- 4.5 - Finally I would suggest a change in title of Director of Agriculture to Director of Agricultural Extension to conform with and be parallel to the title of Director of Agricultural Research at the research Institutes.

B- The Link Between Extension and the Producer

Turning now to the linkage between the Education/Extension component and the Production component (link 2 in figure 1) it should first be said that in many respects this linkage has performed magnificently during the recent past. The rapid diffusion of new technology in wheat, rice, maize, and sugarcane is living testimony to the effectiveness of the communication channels which have been employed. However, unless additional channels are added, and certain reorganization is achieved, this linkage and the Education/Extension component are not likely to be able to cope up with the increases in volume and complexity of information which will be required to flow through them during the next five-year period. Therefore, the following suggestions are made.

Recommendation 5 - A long Range Local Approach

- 5.1 - Each union council should establish an agricultural training service center. The centers at the G.M. Barrage and the Little Barrage operated by the A.D.C. could serve as a partial model, as could the Thana training centres in the area around Comilla in East Pakistan.
- 5.2. - These can be financially self-supporting units, whose farm receipts pay the training costs.
- 5.3. - Basically, each center should include a farm at a convenient location, adjacent to the union council offices where possible. All officers of various departments of government who serve the farmer are officed at this site. If there is a local cooperative, it too should be at the same site. To the extent possible, sources of supplies such as seed, fertilizer, pesticides, etc., as well as short-term production credit should be at this same site.

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- 5.4 - Agriculture Department staff at the center might consist of an Agricultural Assistant and three to four Field Assistants. Their program could include the following:
- 5.4.1 - year long training courses for farmer-trainees which emphasize practical experience.
 - 5.4.2 - two and three day courses for farmers which focus on particular crops.
 - 5.4.3 - regular tours of the center farms which feature demonstrations of as many recommended practices as practical.
 - 5.4.4 - demonstrations carried out in farms throughout the union council area.
 - 5.4.5 - weekly radio forums at the center and in as many surrounding villages as possible, each led by a village discussion leader trained at the center.
 - 5.4.6 - periodic field days with personnel from district level participation.
 - 5.4.7 - cinema van programs for the local community.
 - 5.4.8 - a small library, reading room with all current agriculture department literature available.
 - 5.4.9 - a small soil testing laboratory.
 - 5.4.10 - fortnightly day-time meetings of local farmers.
- 5.5 - The above is a long range sort of proposition. In the immediate future, several of these testing/service centres might be attempted at the Tehsil level, and perhaps at a few locations at both the Tehsil and the union council level.

*** *** ***

Recommendation 6 - Planning Communication Strategy

- 6.1 In developing the strategy for extension efforts to the achievement of Provincial targets it is imperative that an analysis of barriers be made. That is, the question should be asked: Why is it that a target has not already been achieved? The answer to this question should be probed in whatever depth may be necessary to identify barriers which must be overcome, or lessened, or avoided or prevented or evaded.
- 6.2 - Based on the nature of the barriers identified, specific messages can be decided upon for each specific barrier which the field officers will need to communicate. The channels to be used as well as the mediums will be used to transmit the message will be determined and how the message is packaged to give it the greatest possible impact upon the audience.
- 6.3 - For example, if growers are not using recommended amounts of fertilizer as they grow Mexi-Par wheat, the question arises (in attempting to identify the barrier), why have they not done so? If a demonstration demonstrates that the barrier was a lack of knowledge, and they simply did not know that yields would be greater with five bags of nitrogen fertilizer per acre than with two, then the barrier is knowledge. A message can be developed which explains that yields are usually so much higher with five bags than with two that the increased income to the grower will pay for the cost of the additional fertilizer ten times over. Then appropriate channels can be selected which normally reach the grower; and the message can be treated (designed) in such a way that he will understand it, believe it, and be motivated to act upon it.

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- 6.4 - But, if the investigation of barriers shows that the farmer already knows what the recommendation is, and that the reason for his failure to follow it is something else, then effort by extension field officers to communicate the above message to growers will be a waste of time, energy and money and will also not change the quantities of fertilizer being used.
- 6.5. - If, for example the reason (barrier) the grower is not using recommended amounts of fertilizer is that he has insufficient cash to purchase it, and adequate short-term production credit is not available then different messages must be developed for different audiences if the targets are to be achieved. For example, there may be a message for rural bankers (audience) regarding the value to them of providing short-term credit to farmers for fertilizer purchase. Or, there may be a message to fertilizer suppliers (audience) about their opportunities in advancing credit. In the case of tenant farmers, there may be a message for zamindars who are living in the cities (audience) about the larger profits they can realize if they supply fertilizer to their tenants. For each audience, appropriate channels will have to be selected and each message should be treated in such a way as to have the greatest possible impact on the audience.
- 6.6. - If, on the other hand, the reason (barrier) the grower is not using appropriate amounts of fertilizer is that the Field Assistant or Agricultural Assistant recommended something different, then a different communication is indicated. In this case further barrier investigation should be directed at discovering why the F.A. and A.A. have made their recommendations. Following this, different messages may have to be developed for the Field Assistant and Agricultural Assistant as the audience and the appropriate channels selected.

Further, the message will have to be treated in a way that it has the desired impact upon this particular audience.

- * 6.7 - This strategy of extension communication should be carried out at all levels. In order to do so, in-service training of the field staff will be necessary. However, minor changes in the procedures used for issuing instructions to field officers, and those used for receiving reports back from them, can do much to simplify the process.
- 6.8 - For definitions of the key terms used above, extension, message, channel, and treatment, see the appendix to this report.

Recommendation 7 - Transportation

- 7.1 Transportation should be provided for all field personnel. Vehicles could be financed by the Ministry, but owned, serviced, and operated by individual A.A.s or F.A.s. The original purchase of bicycles or motorbike by F.A. and motorbike or jeep by A.A. could be either with direct loan from government or through a cooperative retail type of arrangement within the Department. Loans would be repaid by each officer by deduction from salary at each pay period. Instead of travel allowance, a mileage allowance would be paid to each officer using his own personal vehicle for official business under the scheme. Government might arrange consolidated purchase of such vehicles or even acquire them in whole or in part through an assistance or barter arrangement with a supplying foreign country.

Recommendation 8 - Radio

- 8.1 - The daily use of radio beamed at the production component appears to be excellent. In the short space of just over one year, a regular listening audience has been developed which includes the majority of farmers. Further, a variety of creative treatments are being utilized,

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and growers report that the effort is well received. In terms of program extent and format, it is as far as farm radio show as may be found anywhere in the world, and better than that!

* 2.

In-service training for the entire agricultural department is the next step. This effort if successful will result in ever more efficient work. In addition, we are now under suggestions.

* 3.

A program of audio-visual tape recorded interviews with agricultural leaders and field assistants (perhaps describing results of some of their demonstrations, research projects, and particularly, successful farmers. For example, just after harvest a farmer is interviewed and tells what is a typical yield of a particular crop, what varieties, fertilizers used, and so on. These interviews are made so that it is possible to practice as follows: Some of this is already being done.

* 4.

For a radio station listener service, a monthly publication should be issued. Field assistants, Agricultural Assistants, EACAs, etc., inform them of what topics will be covered on each day of the week, by whom, and any other pertinent information. These officers are prepared to answer questions from listeners while they receive or days of program, etc.

* 5.

The Bureau of Agricultural Information publishes a monthly calendar of the radio programs for the Lahore area. All Agricultural Assistants and Field Assistants in that area should keep these posted on their office walls and in other public places. This is not now being done.

Recommendation 9 - Miscellaneous

In addition, here are some further suggestions for strengthening the linkage between the Education/Extension Component and the Production Component (between Agriculture Department and farmers) which will be relatively simple and could be implemented in the near future:

- * 9.1 - For demonstrations with ~~show comparisons~~ in several varieties or fertilizer treatments, etc., signs should be arranged in such a way that they show not only how each treatment differs from each other but there is a place for the F.A. to write in chalk, results from each plot, costs and other relevant data - these signs could be made well remain in the field several months after a particular demonstration is completed.
- * 9.2 - The Department should develop standardized posters for demonstrations with some information printed on the signs and a space where local personnel could write in, with chalk, specifics of the particular demonstration.
- * 9.3 - The Department should develop a standardized sign which can be appropriately displayed at the office of every F.A.
- * 9.4 - Field Assistants and Agricultural Assistants could make better use of posters and exhibits in their office - perhaps ought to have a bulletin board featuring "what to do this week".
- * 9.5 - Training in agriculture in the first five years of elementary school should be strengthened. Services of FAs and AAs could be offered to schools for that purpose - perhaps for one or two hours a week. If done well this can have tremendous impact on the system in the next generation.

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For addressing, the Bureau of Agricultural Information should consider an Address wrap or Elliott machine, which could be tabbed to select various groups from a master list (perhaps IBM addressing equipment utilizing machines now available in Lahore could be used).

Main body of projection equipment, servicing and cleaning with proper film and tape, and the film library functions of the Bureau of Agricultural Information appear to be less than satisfactory. More space and a higher level of cleanliness is necessary, and a supervised subject of the movement of such operations could probably contribute significantly to both efficiency and quality. Further, some arrangement should be made with a foreign aid agency for assistance in acquisition of spare parts for foreign equipment.

The Bureau of Agricultural Information should be set up to-date with a collection of motion picture films available in West Pakistan, giving brief descriptions of each film, its source, and instructions for presentation. Tape recordings could also be included.

2. Other Liaison and System

Because of interdependence of various types of agriculture animals and plants, coordination is needed among various advisory (extension) services and among research institutes. Poultry research at Ayub Agricultural Institute at Lyallpur is a good example. As milk production increases, however, there will be need of considerably more coordinated research involving poultry rations, breeds, diseases, etc.

2. There is need and opportunity for increased extension education aimed at personnel in the supply and marketing components of the agricultural system.

- 3 - Libraries at all research institutes should be strengthened, should subscribe to more foreign agricultural research journals, should acquire complete back issues of some of these, should keep binding up to date (on an annual basis).
- 4 Research libraries should acquire complete card catalogues of technical books in agriculture even if they do not have the books.

FOOTNOTES:

1. C.A. Svinth, Strengthening Agricultural Extension in West Pakistan, 1965-1970

distributed by:

Planning Cell
Department of Agriculture
Government of West Pakistan
Lahore, November 1975.

2. D.F. Davy, Improving the Training of Field Assistants in the Agricultural Training Institutes of West Pakistan.

Distributed by:

Planning Cell
Department of Agriculture
Government of West Pakistan
Lahore 1977.

V. ACKNOWLEDGEMENTS

To prepare in so short a time a report that even begins to cover a subject as broad as the one at hand requires both a full schedule for the consultant and a high degree of insight and understanding on the part of those interviewed. The latter ingredient I found in ample measure in West Pakistan. Thus, otherwise very brief discussions were often quite fruitful.

May I express my appreciation, at this point to the Minister of Food and Agriculture, and to the Secretary of Agriculture, for the insights which they provided in the two brief meetings I had with each of them. It was my understanding of their description of the task to be performed which led me through this assignment, and it was their counsel and guidance at the end which influenced my drafting of this document. I hope that it will have some value to each of them.

Further, I should like to acknowledge my colleagues in the Ford Foundation, whose overall guidance and mapping of my itinerary put the real substance in my work. I am greatly indebted to Mr. Dermey Davy, who not only accompanied me through the entire period of travel -- from Karachi to Lahore to Peshawar to Lahore to Lyallpur to Lahore to Karachi to Hyderabad to Karachi to Lahore to Karachi to Lahore and back to Karachi again, along with many side trips by motor vehicle to too many places to name at this point, but also provided the warm hospitality of his own home on many occasions, and added a most appreciated personal dimension to my consultancy.

There were many others. At the risk of leaving out several who contributed much to my understanding, let me mention just a few.

To the three regional directors of extension and particularly to Dr. Mohammed Sharif, in the Southern Region, who took three days out of his busy

schedule to shepherd me around the Sind, I am especially grateful. In addition to the things we saw and visited, much of his wisdom, coming out of a whole series of conversations en route, is reflected in the pages above.

May I further single out Mr. A. Ahmed, Principal of the Agricultural Training Institute, Peshawar, Mr. Ranam Chowdhry, Director of Extension Training at Lyallpur University, and Dr. A.G. Bhatti, of the Maize Research Station at Sahiwal.

And the Bureau of Agricultural Information, Mr. M.S. Qureshi and Mr. Maqsood Hussain were particularly helpful.

There were many, many others, and all have won a place in my heart. The net result is to contribute to my feelings of inadequacy and frustration over the short three-week period in which I was among this group. It pained me to leave when I did, and I shall look forward, personally, to return to their midst.

On the written side, I have earlier mentioned the reports of Mr. Cal Svinth and Mr. Dorsey Davy (see footnotes 1 and 2). In addition, there is a vast resource of literature relating to the issues involved. Books like Administrative Problems in Pakistan, by Guthrie Birkhead are particularly relevant. In the field of public personnel management, there is an extensive literature upon which the recommendations I have made are based. This is also true in the field of human communication and in the more specialized area of agricultural extension education. A short bibliography of some of this material is included as Appendix E.

Lastly may I express my appreciation for the opportunity to come to Pakistan at this time. It has been an inspiration to me, personally, to come to know and respect so many of those who are taking up the challenge of Pakistan's agricultural revolution.

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APPENDIX - A: Itinerary

January 24 Arrive Karachi
Program Discussions at Ford Foundation Office.

January 25 Fly to Lahore.
Appointments with senior officials including:
Malik Khuda Bakhsh Bhatta Minister of Food and Agriculture.
Mr. Amir Ahmed Khan, Secretary of Agriculture.
Mr. Shafi Gill, Director of Agriculture, Central Region.
Mr. M.S. Qureshi, Director of Information.

January 26 Appointments with AID personnel including:
Mr. Leon Hesser, Food and Agriculture Officer
Mr. C. William Kootes, Director AID
Mr. Gerry Brocksiepe, Extension Advisor
Discussion of Pakistan's agriculture with Ford Foundation
Agricultural Advisors.

January 27 Examination of Agricultural Planning in West Pakistan including:
Mr. B.A. Qureshi, Chairman, Planning and Development Board.

January 28 Meetings in Peshawar with:
Major Faal Dad Khan, Director of Agriculture Northern Region.
Mr. Ahmed. Principles, Agricultural Training Institute, Peshawar.
Mr. Faridullah Sawhney, Director, Pakistan Academy of Rural
Development, Peshawar.
College of Agriculture Peshawar University.

January 30 Drive to Rawalpindi including:
Tarnab Agricultural Research Institute
E.A.D.A., Campbellpur
Visit to farms in the region.

- January 31 Visit to Kala Shar Kala Rice Station.
- February 1 Drive to Lyallpur for appointments with:
Mr. Rahim Chowdhry, Director of Extension Training, Lyallpur University.
Dr. Anwar Hussain, Director, Ayub Agricultural Research Station
Dr. S.A. Qureshi, Coordinator of Wheat Improvement.
- February 2 Return to Lahore visiting farmers and extension projects in the SCARP area.
- February 3 Meetings with Extension personnel in the Lahore area.
- February 5 Fly to Hyderabad for visits to:
Dr. Muhammed Sharif, Director of Agriculture Southern Region
Dr. M.M. Siddiki, Director of Agricultural Research Institute Tandojam
Atomic Energy Commission Agricultural Institute, Tandojam.
Mr. Pirzada, Principal College of Agriculture, Tandojam.
- February 6 Tour of Southern Region visiting farms and extension efforts.
- February 7 Visit to ADC project area in G.M. Barrage.
- February 8 Fly to Lahore for working session with M.S. Qureshi, Director Extension Information.
- February 9 Drive to Sahiwal for visits to:
Dr. A.G. Bhatti, Maize Improvement Botanist
Machinery Demonstration Unit, Government of West Pakistan
- February 10 Review of the Basic Democracies system in Pakistan with specialists in Lahore.
- February 11-13 Drafting and finalizing of the report.
- February 14 Review of major conclusions of study with:
Malik Khuda Bakhsh Bucha, Minister of Food and Agriculture
Mr. Amir Anwar Khan, Secretary of Agriculture.
- February 15 Depart Pakistan.

APPENDIX - B: Methodology

The purpose of this appendix is to describe briefly the methods used in West Pakistan in order that readers may put into an appropriate context the statements made in the main body of this report.

First of all, the data collected are all impressionistic, based on observation and conversation with a great variety of individuals. Casual observations were made in the field in offices of staff of the Department of Agriculture, and in homes of farm operators and others connected with them during the course of the travel which is detailed in the itinerary found as Appendix A of this report.

The conversations were generally brief, unstructured interviews. Some conversations were entirely in the English language. This is particularly true of interviews with personnel of the Department of Agriculture above the level of field assistant. With many of the field assistants, and with almost all of the farmers, conversations were carried on through the assistance of various individuals who served as interpreters. These included mostly Agricultural Assistants, Extra Assistant Directors of Agriculture, and Deputy Directors of Agriculture, but also occasionally included private citizens and others.

Because of the need for translation and interpretation, there was great opportunity for misunderstanding, wrong impressions, and for me to gain a false picture of the situation. For example, the interpreters may not have understood the questions I was asking to have the same meaning which I was trying to convey. They, in turn, may have been misunderstood by farmer respondents in the same way. Then, farmers were undoubtedly influenced in the answering of

these questions by their expectations of the kind of answers which would have pleased either the officials of the Department of Agriculture who were present or the foreign visitor who was asking the questions.

Many kinds of people constituted the respondents. In addition to the staff of the Department of Agriculture including Field Assistants, Agriculture Assistants, Extra Assistant Directors of Agriculture, Deputy Directors of Agriculture, Directors of Agriculture, and various other persons connected in one way or the other with government service in agriculture there were a great variety of farmers. Some of these were share-croppers and tenants. Others were land-holders ranging in size from around 2½ to 5 acres up through with several around 100 acres, and a few in the 500 acre bracket. Some of them were well-educated, and others had little or no formal schooling. Most were actually residents on their land, but a few of the large landholders were residents in large cities, and operated their farms through tenants. Geographically they were distributed from the Northwest Frontier, through Peshawar to the Sind, and tended to include mostly people whose farms were adjacent to a paved road. In fact, most of them were near the main arterial highway. This was particularly true in the area around Peshawar, on the road between Peshawar and Rawalpindi, on the road between Lahore and Lyalpur, and near the Sindh. In the latter area, much of the interviewing was with people in rather remote locations.

The sample which was selected for my observation and interviewing tended to be chosen by officials of the Department of Agriculture. One could conjecture that the farmers represent the more cooperative and more highly influenced members of this group, reflecting greater participation with individuals and programs of the Department of Agriculture than the average farmer.

however, they are not a sample of any particular larger population, and thus, all of the generalizations in my report must be considered impressionistic. There is no valid basis for generalization about the agricultural population of West Pakistan on the data which I collected.

The questions which were asked, themselves, were many and varied. Usually, I tried to identify some practice on a farm which was relatively new. Then I asked all kinds of questions to find out why it was that the individual farmer had adopted the new practice. Further, I tried to find out which means of communication (channels) were used by him in regard to that particular practice, and then, in general.

For example, most growers to whom I was taken were in fact, growing Mexipak wheat. In such case, I asked what variety they were growing, and then I asked about the fertilizers they were using and the cultural practices. I tried to identify things which were being done differently this year from previous years. Then I tried to find out what influenced the grower to make the change that he had made. Then I tried to identify the ways in which the grower communicated with other growers, with the Department of Agriculture, and with the wider world in general.

In addition to asking about wheat, I asked about rice varieties, about fertilizer (availability, credit, etc.), and about pesticides.

Further, since most of the farmers with whom I talked mentioned the radio as a primary source of information, I asked them other questions about the radio. I asked how often they listened to the farm programs; I asked which stations they listened to; I asked whether they usually listened alone or in the company of others, and then I tried to get some evaluation from them of the

credibility that the radio programs had in comparison with other sources of information.

I also asked about the use of the printed word, contact with Field Assistants and Agricultural Assistants, participation in meetings, tours and demonstrations.

When talking with officials of the Department, I asked questions relating to their own careers, career development, training and background, and aspirations. I asked about the ways in which they received the information with which they dealt, and the ways in which they tried to pass it on to their clientele or to those over whom they had supervisory responsibility. In addition, I asked about the goals and objectives of each man, and tried to get some idea of his particular program as it related to the overall program of the Department.

Usually, no written notes were made during the interview. This was particularly true in interviews with farmers. However, on some occasions, I did, visibly, make written notes during conversations with officials of the Department of Agriculture.

Each evening, however, extensive notes were made summarizing what had transpired during the day. These were then finally partially analyzed and summarized and are reflected in the main body of the text.

The report above, however, is not a summary of all the things that I observed or heard. Rather, it is a summary of the general impression I have of the situation after having observed and heard all of these things, and then it is a detailed summary of the kinds of individual recommendations which emerge in the conversations with various people with whom I talked. Many of the recommendations

are based directly on suggestions made to me by officials of the Department of Agriculture. Other recommendations are based on the impressions I had of the situation in West Pakistan, knowledge of similar problems faced in other parts of the world by similar agencies and organizations, knowledge of practices followed elsewhere which seemed to have proven successful in similar situations, and on some of the principles which are listed below in Appendix C.

APPENDIX - C. Principles

The statements below are submitted as propositions or hypotheses which may be considered to be principles of human behavior as they relate to agricultural extension and action. Like all principles of human behavior they are neither true nor false. To the extent that they are principles, they will tend to be true more often than false. As such, they can be extremely useful as aids to thinking and guides to action.

1. What a man sees, he can doubt; what a man hears, he can doubt; but what a man does himself, with his own hands, he cannot doubt. (S.A. Knapp).
The success of any training program tends to be directly related to the extent to which its participants carry out with their own hands all of the significant activities about which they are being trained.
2. The willingness and ability of any group (Pakistan Village) to accept change tends to be directly related to the volume of their communication with the outside world.
3. The success of an agricultural extension program in any particular village tends to be directly related to the extent of personal contact between the people of that village and the staff of the agricultural extension organization.
4. The success of a first time agricultural extension worker (Field Assistant or Agricultural Assistant in Pakistan) tends to be directly related to the extent of multiple use of communication methods.
5. The success of an agricultural extension program tends to be directly related to the extent to which:

- a. the pay-off to farmers of recommended practices is high,
- b. the cost to farmers of recommended practices is low,
- c. recommended practices are relatively simple,
- d. the pay-off to farmers is immediate,
- e. the recommended practices may be tested by individual farmers on a trial basis prior to complete commitment.

6. The cycle of agricultural extension program development may include the following aspects as:

- situational analysis
- identification of problems (opportunities)
- establishment of goals (targets)
- analysis of barriers (why have goals not already been achieved?)
- finding appropriate messages
- designation audience(s) for each message
- selecting best combination of channels to carry message(s) to audience(s)
- identifying treatments for each message which will achieve the greatest impact
- operating (conducting appropriately treated messages via selected channels to designated audience(s))
- evaluating extent to which goals have been achieved
- situation analysis
- identification of problems (opportunities)
- etc.....THE PROCESS IS CONTINUOUS

7. The extent to which the goals of any agricultural extension program will be achieved tends to be directly related to the extent to which they are clearly understood by those responsible for carrying out the program.
8. The extent to which the goals of any agricultural extension program will be achieved tends to be directly related to the extent to which those at whom the program is directed have participated (perhaps by representation) in establishing the goals.
9. The extent to which the goals of any agricultural extension program will be achieved tends to be directly related to the extent to which the planning process is continuous. To plan is to study the past and the present in order to forecast the future, and in light of that forecast, to determine alternative courses of action, and then to decide what is to be done, when it is to be done, where it is to be done, how it is to be done, and by whom it is to be done. (F. Reeves.)
10. The extent to which the goals of any agricultural extension program will be achieved tends to be inversely related to the number of those goals.
11. The extent to which the goals of any agricultural extension program will be achieved tends to be directly related to the extent to which various external factors are taken into consideration in planning the program.
12. The effectiveness of individual change agents (Field Assistants and Agricultural Assistants) in an agricultural extension program tends to vary inversely with the social distance between the change agent and the members of his target system (farmers.). Social distance includes difference in language, education, economic level, age, family status, physical distance etc.

13. The effectiveness of an agricultural extension program tends to vary inversely with the economic well being of its audience (the farmer) at the beginning of the program.
14. The success of an agricultural extension program tends to be directly related to the extent to which it is supported by comprehensive and coordinated effort involving all government departments at the local level.
15. The learning and adoption of improved farm practices tends to be facilitated by the existence and participation of farmers in organized groups.
16. Farmers are likely to adopt the practices being recommended by the field staff of an agricultural extension education organization directly to the extent that the services and supplies which are required as inputs in order that recommended practices may be adopted are supplied either as part of or in close association with the training they received. The extent to which inputs and credit are available in the same building, or the same cluster of buildings or the agricultural extension worker tends to be directly related to the extent to which recommended practices will be adopted.
17. The more communication channels in parallel between a communicator (agricultural extension staff) and his audience (farmers) the greater the chance that any particular message sent by the communicator will be received by the audience.
18. The more communication channels in series between a communicator (agricultural extension staff) and his audience (farmers) the less the chance that any particular message sent by the communicator will be received by the audience.

19. The effectiveness of communication between any sender and receiver tends to vary directly with the fidelity of the channels employed.
20. The effectiveness of communication between any sender and receiver tends to vary directly with the capacity of the channels employed.
21. The effectiveness of communication between any sender and receiver tends to vary directly with the degree to which treatments are constructed with symbols which have the same meaning for both the sender and the receiver.
22. The effectiveness of communication between any sender and receiver tends to vary directly with the extent to which that receiver (audience) attends to the channel(s) being utilized.
23. The effectiveness of communication between any sender and receiver tends to vary directly with the receiving skills of the receiver (audience) in regard to the particular channel(s) utilized.
24. The effectiveness of communication between any sender and any particular receiver tends to vary inversely with the number of other receivers who also constitute the audience for that particular communication.
25. The effectiveness of communication between any sender and audience tends to vary inversely with the amount of time which lapses between origination of the treatment by the communicator and the perception of the treatment by the audience.
26. The effectiveness of communication between any sender and audience tends to vary directly with the extent to which that audience associates the channel(s) used as channel(s) typically used by persons of status equal to or higher than its own.

27. The success of an agricultural extension program tends to vary directly with the extent to which its "first-line workers" are local persons selected by the group to be served.
28. The success of a first-line agricultural extension worker (Field Assistant or Agricultural Assistant) tends to be directly related to the extent to which he is alienated and confident.
29. The impact of agricultural writing directed at farmers tends to be directly related to the extent to which it employs the same words these farmers typically use (with similar meanings), the same type of phrases, with the same sort of feelings.

APPENDIX - D: Definitions for Research in Extension Planning, Communication Strategy.

Barrier - A barrier is anything which tends to prevent or obstruct the achievement of a goal (target). A barrier is anything which interferes with the receipt of a message by an intended audience. The barrier is usually to be identified by asking the question, "Why is it that the goal has not already been achieved?" Typical barriers found in agricultural extension work were: to prevent farmers from accepting and adopting the recommendations of agricultural extension personnel, lack of knowledge of profitability of the new practice, lack of knowledge of the details of the practice being recommended, lack of interest in the particular practice, lack of appreciation of differences which are to be received by adopting the practice, lack of perceived utility to carry out the practice, lack of required skills, lack of required equipment, lack of available inputs, lack of familiar sources with which to acquire necessary inputs, lack of short-term production credit. Other kinds of barriers are: inhibitory, diffidence in language between agricultural extension workers and farmers, lack of access to the channels of communication being used, numerous beliefs which are, stages that appear to be recommended practices are unacceptable, etc. In the example given on page 30, one barrier suggested was a lack of knowledge by farmers that yields would be greater if more fertilizer were used. Another barrier which was suggested was that the farmer did not have sufficient cash to purchase the fertilizer. A third barrier suggested was that the farmer was

receiving conflicting information from local personnel of the Agriculture Department.

Message - The message is a statement of the change to be made by the audience.

The message is the intent of the communication. In an agricultural extension program, messages are usually statements of the goals or targets to be achieved. However, for one general goal, there may be several particular messages which are developed to overcome a particular barrier. For example, if the goal or target is that farmers growing new short-stemmed wheat should use more chemical fertilizer, one message might be aimed directly at farmers, and have the intent of having them know more about the differences in yields which can be expected with applications of different amounts of fertilizer. A different message may be aimed at the same audience of farmers with the intent of having them know where they can secure short-term production credit which would finance the purchase of fertilizer. A third message, relating to the same general goal or target, might be aimed at the audience of rural bankers, and be intended to explain to them why it is to their advantage to make loans to farmers, and showing them how they can protect their own investment in such loans.

The more simple the message, the greater the chance that it will get through to its audience. The better a message is understood by its sender, the greater the chance that it will get through to its audience.

Audience - The audience is the group of people (one individual or many) whose behavior is intended to be changed by receipt of the message. Behavior includes thinking, feeling, and/or action. An audience may include an aminder, all of the farmers in a particular village, all of the farmers in a tehsil, or it may be defined much more narrowly. For example, the audience may be only the farmers who are over 21 years of age and under 35 years of age. Or, it may include only farmers who are over 35 years of age who have irrigated land, and who farm less than 7 acres of it. The more narrowly an audience can be defined, the greater the chance that particular messages can be communicated to them. For example, in the Sind, there is one group of farmers who typically speak Punjabi. Another group typically speaks Sindhi. It is to the advantage of the communicator to separate this audience into two groups, and deal with each group independently. The same may be said of any other separations which the communicator can make within the audience, so that he can specifically design particular messages for particular groups within the audience.

Channel - A channel is any tool which can be used by a communicator to get his message to his audience. It includes such things as a face to face visit, a meeting, a tour, a demonstration, a newspaper, a magazine, a printed folder, a poster, an exhibition, a radio program, the telephone --- and many, many, many other things. For example, if the Director of Agriculture wants all Agricultural Assistants to know something, he might telephone each Deputy Director of Agriculture

and as him to pass the message on. Telephone would be the channel. Or, he might write a letter to each Agency Director, with the same request. The mail would be the channel. On the other hand he might print a little leaflet and send it by post to the District Director of Agriculture, asking him to pass it on to the appropriate individuals. In this case, the printed leaflet would be the channel. Or, if it were his turn to be on the radio, he might broadcast his message over the air, the radio being the channel. These are typically used by Field Assistants in their work: the demonstration, farm visit, the tour, the exhibition, the office visit, and the poster. For a series of principles relating to the use of these channels see APPENDIX - C, above.

Treatment - The treatment is the design of the message, its use and presentation. If the message is to be used in a particular way, the treatment is the content. Given a particular message, there is a particular audience on a particular occasion, and there is always infinite variety of treatments which could be employed. For example, if the message, "Use one bag of superphosphate per acre of the land you plant Mexique wheat" is to be sent to literate farmers in the fortnightly newspaper of the agriculture department, there are an infinite number of ways in which this message could be treated. For example, the whole story could be told in words. Or, pictures could be used. This would be two different treatments. If it is to be printed text, it could be a direct quote from the Minister of

Agriculture, urging everyone to use superphosphate. Or, it could be a success story quoting one farmer who used superphosphate on his Mexique wheat last year and in the story could tell of its success and the profits he made. Or, it could be a large picture of a demonstration with an article by the Agricultural Assistant in which he tells how much greater the yields were on the plot where superphosphate was used, than they were on the other plot where superphosphate was not used. All of these are different treatments for the same message.

The message can be very simple. It could be "This is a plot in which Mexique wheat is being demonstrated." The sign could be placed alongside of the road between the road and the demonstration plot. The sign could be all these farmers who pass by. Give this sign, again, there is an infinite number of treatments which are possible. The sign could be painted white and the words "Mexique Wheat Demonstration" lettered in black. Or, the sign could be painted yellow and the lettering in black. Or, the sign could be painted white and the lettering in green. Or, the sign could be painted blue and the lettering in white. All of these are different treatments of the same message. Further, the sign might be black with yellow lettering and then a space below in which the agricultural assistant could write in white ink the name of the grower, the date on which the Mexique was planted, and the amounts of fertilizer used. Again, this is another treatment for

the same message on the same channel intended for the same audience. The only limitation to the number and variation of treatments for any particular message on any particular channel intended for any audience is the creative ability of the communicator who sends it.

Impact - The impact is the extent to which the audience has made the change in behavior as spelled out in the message. For example, if the message is to use superphosphate on your Mexipak wheat, and the audience consists of 100 farmers, then the impact can be measured, in principle, by counting the percentage of the 100 farmers who, in fact, agreed to the use of superphosphate on their Mexipak wheat, and who would not have done so if they had not received the message. Measuring of the impact is a complicated process, but it can be done in many simple ways. To measure impact of a given communication is to evaluate the effectiveness of that communication. Many agricultural extension educators, throughout the world, resist measurement of impact. As long as they do not measure impact, they cannot be said to have failed in their efforts (or to have succeeded). The only way to know which channels are best, over time, for reaching a particular audience, is to measure impact. The only way to know which messages have been successfully communicated and which messages have failed to be communicated, is to measure impact.

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2. Chemical analysis.

The chemical analysis of the object shows that it is composed of a mixture of various elements. The most prominent elements are carbon, oxygen, and hydrogen. There are also smaller amounts of nitrogen, sulfur, and phosphorus. The analysis indicates that the object is a complex organic compound, possibly a protein or a polymer. The presence of these elements suggests that the object is of biological origin. The analysis also shows that the object is highly stable and does not react with most common reagents.

3. Physical properties.

The physical properties of the object are as follows: it is dark in color, has a rough, granular texture, and is highly stable. It is not soluble in water or most common solvents. It is also not flammable and does not react with most common reagents.

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Figure 1 shows four schematic representations of two-dimensional lattices. (a) A square lattice with nearest neighbor interactions (indicated by a double-headed arrow between adjacent sites) and next-nearest neighbor interactions (indicated by a single-headed arrow between sites at a distance of two units). (b) A square lattice with nearest neighbor interactions (indicated by a double-headed arrow between adjacent sites) and a diagonal interaction (indicated by a single-headed arrow between sites at a distance of one unit along the diagonal). (c) A square lattice with nearest neighbor interactions (indicated by a double-headed arrow between adjacent sites) and a diagonal interaction (indicated by a single-headed arrow between sites at a distance of one unit along the diagonal). (d) A square lattice with nearest neighbor interactions (indicated by a double-headed arrow between adjacent sites) and a diagonal interaction (indicated by a single-headed arrow between sites at a distance of one unit along the diagonal).

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9. *Journal of the American Medical Association*, 283, 10, 1243-1248 (2000).

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1. Set up fertility trial on large area of land to determine optimum rate of fertilizer application for maximum fertility level in various soil types. Proceedure for this trial is as follows: Outline area of land to be used for trial. Divide area into 10 equal plots. Apply different rates of fertilizer to each plot. Harvest and analyze crops from each plot. Determine optimum rate of fertilizer for each soil type.
2. Determine optimum rate of fertilizer for each soil type. At the end of the trial, two samples of soil from each plot are taken and analyzed for fertility. The results of the analysis are compared with the results of the trial to determine the optimum rate of fertilizer for each soil type.
3. Determine optimum rate of fertilizer for each soil type. At the end of the trial, two samples of soil from each plot are taken and analyzed for fertility. The results of the analysis are compared with the results of the trial to determine the optimum rate of fertilizer for each soil type.
4. Initiate trial, in collaboration with local agronomist, to determine optimum rate of fertilizer for each soil type.

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2. Send two more men to the United States for postgraduate study and research in Mexico. Send one to the United States for a Ph.D. degree.

At the end of this period, the men are available candidates will indicate future training needs.

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2. The second part of the report is devoted to a description of the methodology used in the study.

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4. The fourth part of the report is devoted to a discussion of the results of the study.

1. The first part of the discussion is devoted to a discussion of the results of the study. The data show that the project has been successful in achieving its objectives.

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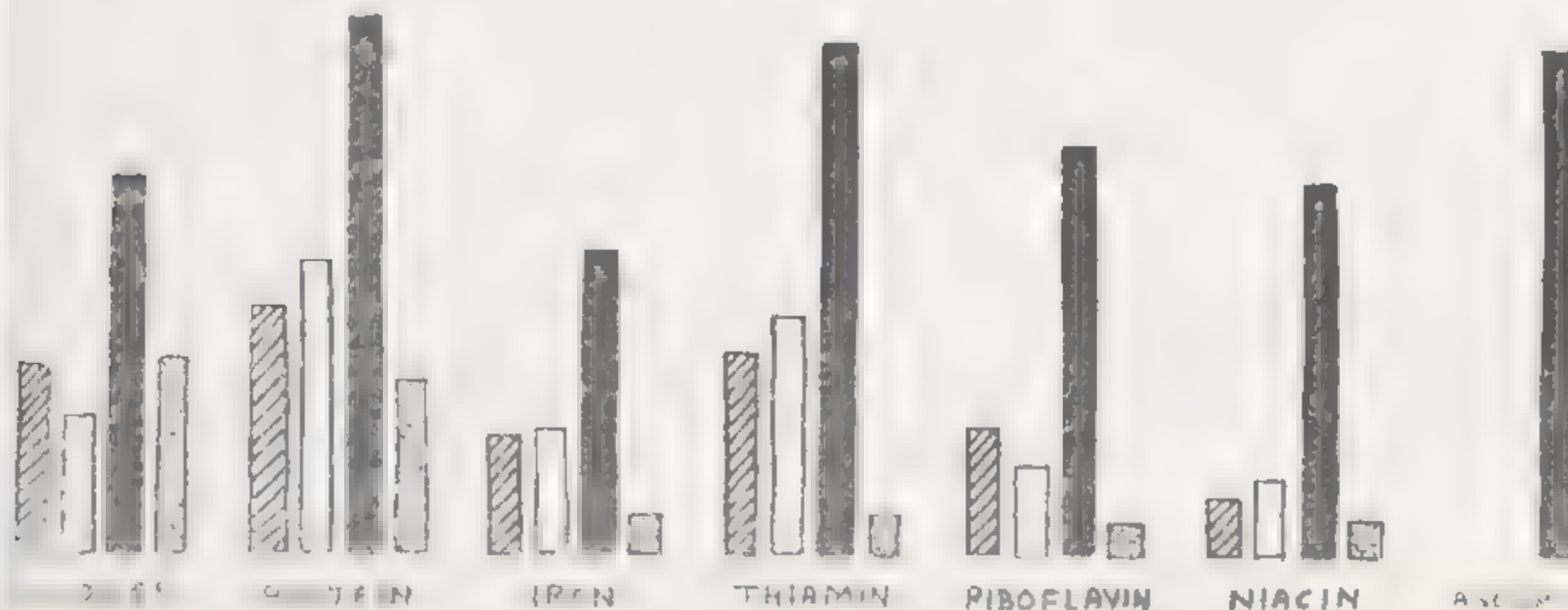
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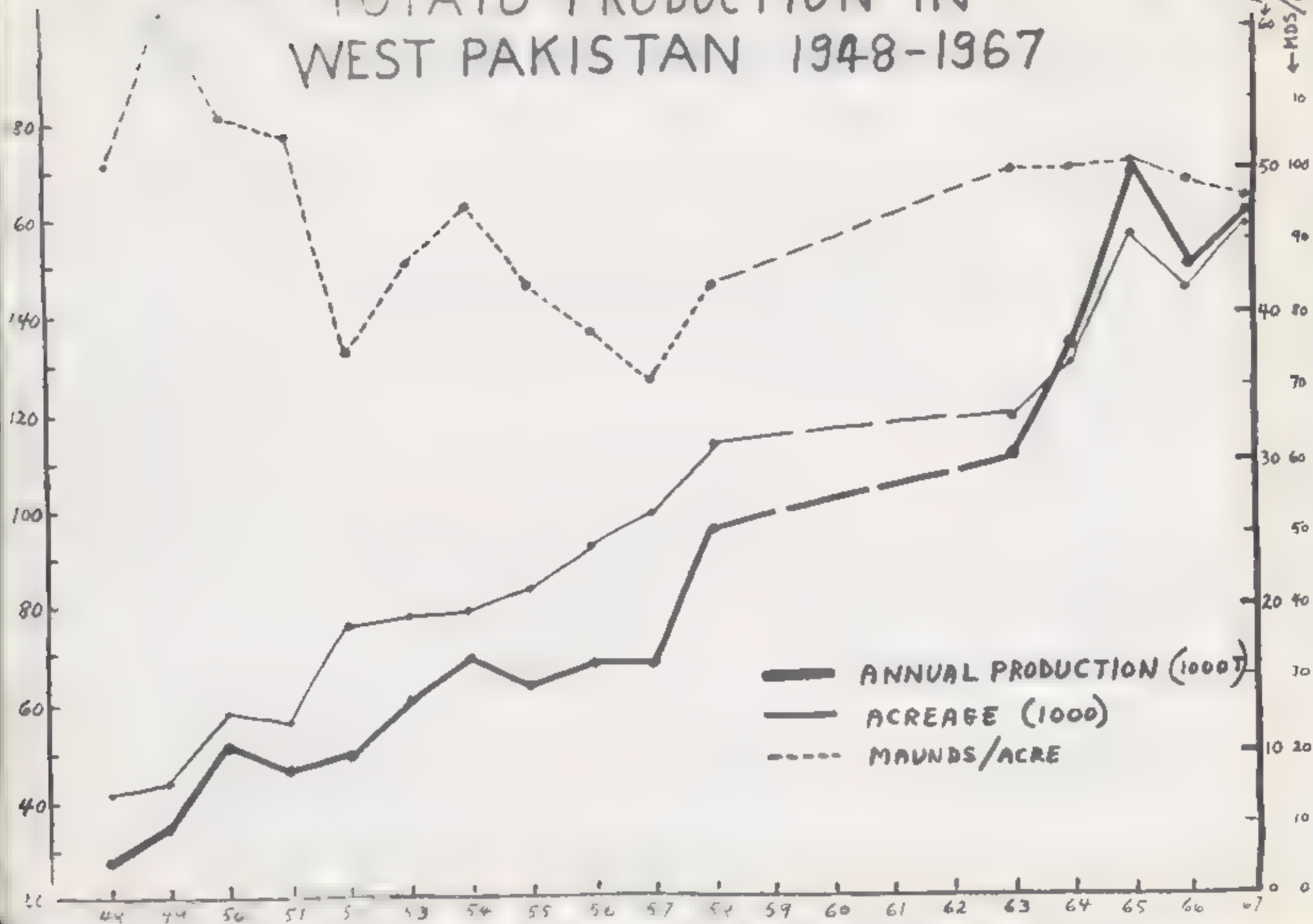
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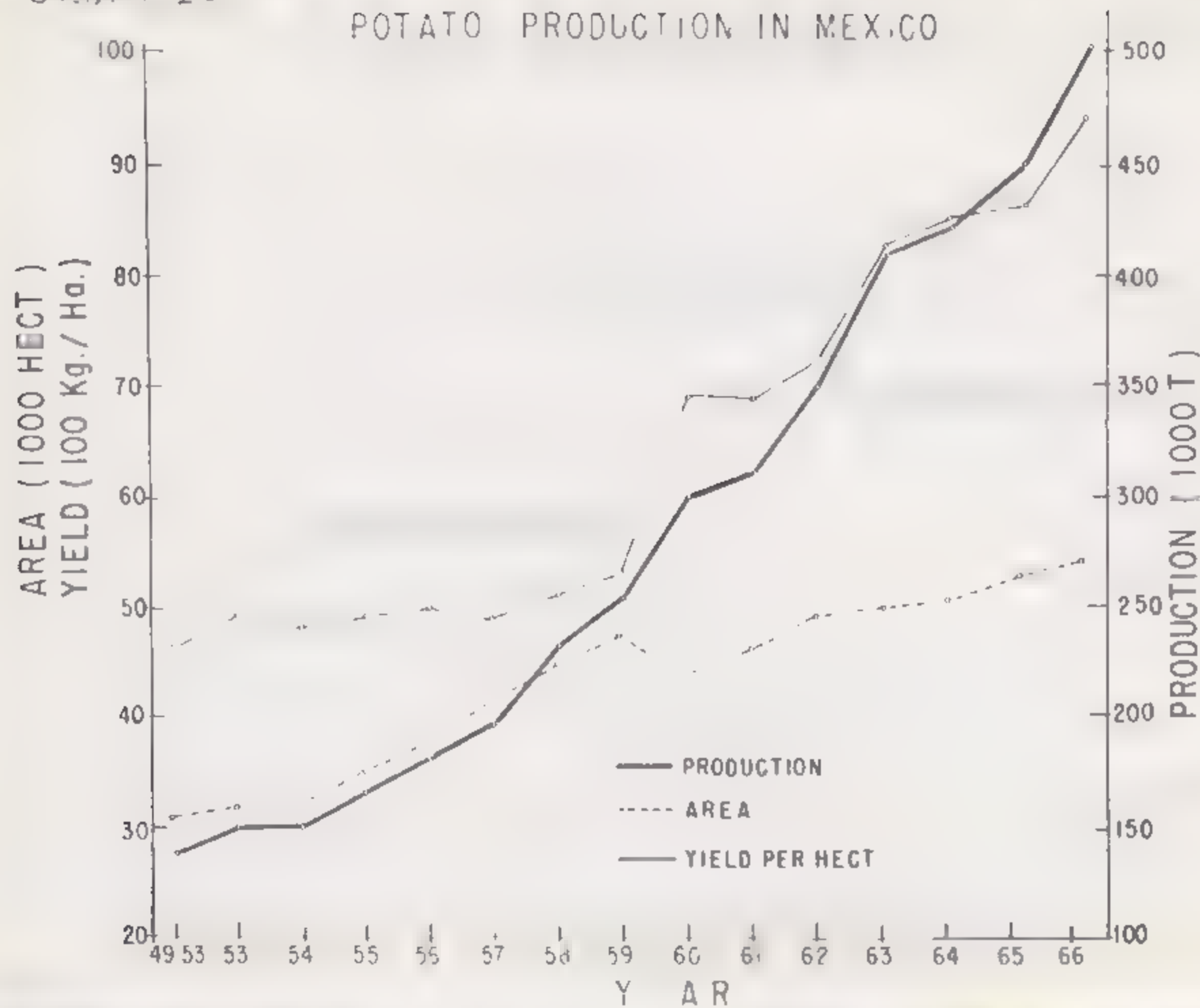
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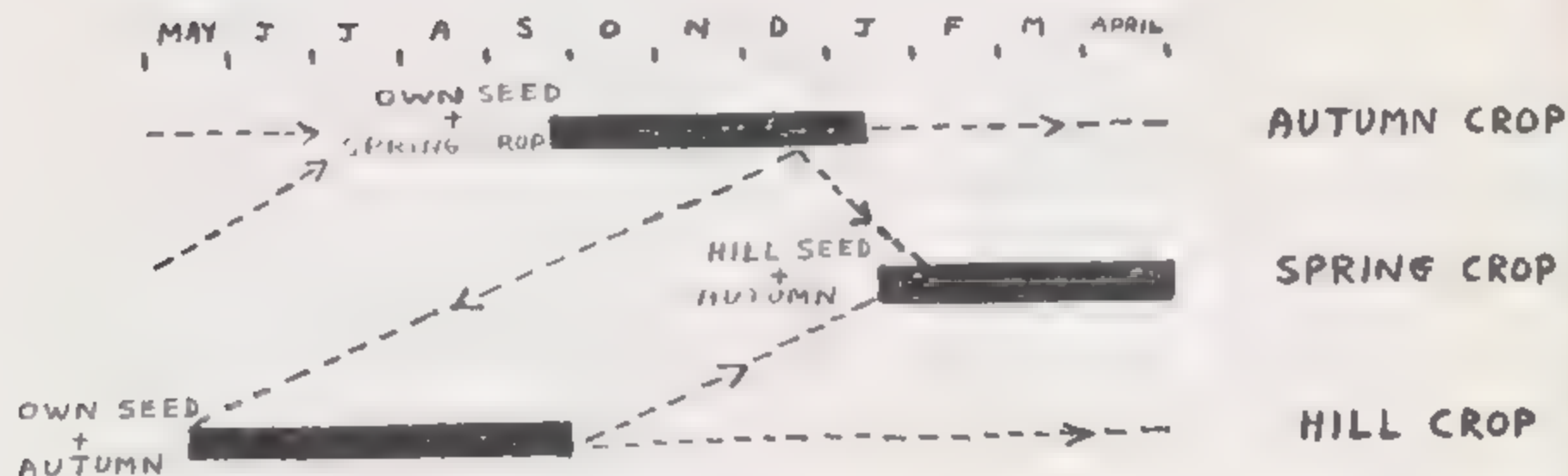
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SELECTION PROGRAM FOR WEST PAKISTAN



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SPRING CROP : MULTIPLY SEED FOR AUTUMN CROP

HILL CROP : BASIC SEED MAINTAINED*
CERTIFIED SEED TO SPRING CROP

* VITAL TO PROVINCIAL POTATO SEED PRODUCTION PROGRAM

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Lahore
November 29, 1965

To: Amir Ahmed Khan
Secretary of Agriculture
Government of West Pakistan
Lahore

From: C.A. Swinth
Consultant on Agricultural Extension

Subject: Strengthening Agricultural Extension in West Pakistan 1965-70

Sir, through Ford Foundation you invited me to study your agricultural extension service, to recommend how extension officers could make their greatest contribution toward the production targets of the Third Plan, and what training programs are needed.

During September-October 1965, I have travelled almost 10,000 miles in West Pakistan, by Land Rover, train, and plane. Your three regional directors of agriculture have been most candid in discussing problems, and I acknowledge my special debt to Shafi Gill, Malik Fazal Dad Khan, and Mohammad Sharif. I have talked to most of the DDAs, and at least a hundred EADAs, Agricultural Assistants, and Field Assistants. I questioned farmers about the service they receive. I visited Lyallpur University, Peshawar and Tandojam Colleges, and the five Agricultural Institutes. Their faculties gave me insights about the boys they trained for the extension service.

I found some who were critical of extension, and others who had the highest praise for specific officers.

Most were agreed that the present extension officers are not fully equipped with the latest scientific information needed to make

a strong contribution to production under the Third Plan. Some kind of continuous training program is needed.

I summarize in this report my observations from the last three months, and my recommendations how the extension officer can be trained to play a maximum role in production. All the proposals in this report have originated with the extension staff, and most of the proposals are already in use by some officers.

I make this prediction. West Pakistan now employs about 4,400 men in various systems of agricultural extension. There are within this 4,400 a substantial number of capable leaders, and within the ranks there are a large number of dedicated men, who need only up-to-date technical knowledge, more effective demonstration techniques, and good leadership, to increase their effectiveness.

If Agriculture Department, and other agricultural agencies which employ extension systems, will now adopt a form of periodic retraining for extension officers, closely related to the research service, I am confident your effort will be rewarded by a substantial gain in crop harvest by 1970. In fact, a substantial part of the Rs.282 crores increase in agricultural output, which you seek in the Third Plan, will depend on how well this revitalizing of the extension services is accomplished.

The observations in this report apply in general to the needs of other departments under the Secretary of Agriculture, notably Animal Husbandry, Forestry, and Fisheries, but it was beyond the scope of my assignment to study those departments.

Note on Pakistani Terms (for foreign readers)

Local language terms used in this report may be translated
by foreign readers as follows:

Pakistan currency:

One rupee = U.S. 21 cents
One lakh rupees = \$21,000
One crore rupees = \$2.1 millions

Pakistan weights:

One maund = 82 pounds. 27 maunds = one metric ton

Cropping seasons in West Pakistan:

Kharif = summer cropping season (May-October)
Rabi = winter cropping season (October-May)

1. The crop production targets of the Third Five Year Plan 1965-70
make a stronger extension service necessary

During 1960-65 the contribution of agricultural production to the Gross Product of West Pakistan rose from Rs. 760 to Rs. 905 crores (both measured at constant 1959-60 prices). This was a creditable achievement, which is now known throughout the world.

West Pakistan achieved this increased production of about 4% a year mainly by investments in two agricultural inputs -- more irrigation water and more fertilizer. The research service and the extension service did not play a major role, according to the Pakistan Planning Commission.

Looking ahead, the agricultural Third Plan for 1965-70 sets even more ambitious targets -- a jump from Rs. 905 to Rs. 117 crores in the contribution of West Pakistan agriculture to the Gross National Product (measured at constant 1959-60 prices). This is an increase of 31%, representing an annual growth rate of 5.5%.

Again your economic planners estimate this can be done largely by more irrigation water and more fertilizer.

They may be right that Third Plan targets can be achieved through the planned inputs of water and fertilizer.

But I believe if the extension service were provided with additional training, and a change of extension techniques, the work of extension will be an important factor in achieving the full benefits from new inputs of water and fertilizer.

Moreover, beyond 1970 strengthening the extension service is even more critical. Sustaining momentum in an agricultural revolution is a complex process. Those of us who have been watching countries move from subsistence agriculture to highly productive commercial farming have found that one or two new inputs will cause an initial spurt of production, but beyond that first jump, many kinds of agricultural services are necessary.

Without a larger contribution by the research and extension services, beyond 1970, I doubt that the momentum of the agricultural revolution can be sustained. That is my personal judgment. Now is the time to begin remedial actions, which require a number of years to carry out.

This paper will identify the increased role of the extension service, what changes are needed in extension methods, and what training will help the extension officers perform their assignment.

The starting point of this paper must be the production targets. Let me comment on the role of the extension officer in some of the Third Plan schemes.

More irrigation water and more fertilizer. The Plan proposes about Rs.300 crores for more irrigation water in West Pakistan, and this will raise the total supply of irrigation water 33% in 1970, compared to 1965. The Plan also provides about Rs.55 crores for manufacture of fertilizers in West Pakistan and this investment together with import of finished products is expected to increase the fertilizer supply by about 200% in 1970, compared to 1965.

These proposals are sound, and I understand the fertilizer targets are being increased still further.

My concern is what happens when this increased water and fertilizer reaches the individual farmer. Any crop specialist will tell you that cultural practices must change on the farm, when more water and fertilizer are added. Plant population must be increased. This means more seed per acre. It also means more careful levelling of the seedbed, otherwise the seed on the high ground will not germinate, and seed on the low ground will be drowned. A denser plant population brings more plant disease, and more insects, because both disease and insects thrive in the shade of a dense crop. This requires new and better plant protection measures. Some of your crop varieties, which have been selected for decades to survive under drought and low fertility, must now be changed to accommodate the more plentiful water and higher fertility.

Who is going to instruct the farmer in these new practices?

The farmer will learn for himself, by a long process of trial and error, if you leave him alone. But that will be wasteful of Pakistan's huge investment in new irrigation water and new fertilizer.

It is faster and cheaper to retrain the extension staff immediately with the new knowledge, and send them into the field with new demonstration methods, which can bring about changes of cropping practices in the shortest possible time, certainly before 1970.

The Research Service has an important role, both in developing the new knowledge about cropping practices, and in helping to train the extension officers.

The Agricultural Information Service has a critical role, in supplying new bulletins on production practices.

More wheat. Governor Malik Amir Mohammad Khan stressed a Third Plan target when he announced in September 1965, that growing more wheat during the winter of 1965-66 was the highest priority in the agricultural program, and that Pakistan should reach self-sufficiency in foodgrains as soon as possible. Pakistan had imported one million tons of wheat during the preceding year, to supplement 4.5 tons grown domestically.

A key strategy of the grow-more-wheat drive is introduction of Mexican dwarf wheat, which has been on trial in West Pakistan since 1961, and recently has achieved yields of 70-80 maunds per acre on both experiment stations and private farms (compared to the average wheat yield of 10 maunds per acre on private lands using local varieties).

How fast this Mexican dwarf wheat might spread is indicated by the seed supply shown in the following table, prepared by the chief Mexican adviser in Pakistan, Dr. Ignacio Narvaez:

	Mexican dwarf seed supply will be sufficient for following acreage
1965-66 winter crop	9,400 acres
1966-67 winter crop	300,000 acres
1967-68 winter crop	6,000,000 acres

The demand which this new wheat program will make on the extension officers is clear. Every officer must be given a short course in the cropping practices of this new wheat -- its seedbed

requirements, the seeding rate, the fertilizer needed, the irrigation practices, the plant protection procedures, and fumigation of seed storage places.

By October 1966, it will be necessary to organize thousands of demonstration plots of this new wheat on private lands. This will be a major extension activity, requiring special instruction and supervision. (Details for demonstration plots are reviewed later in this paper).

There is reasonable expectation that Pakistan can become self-sufficient in foodgrains before 1970, possibly sooner, but only if the extension service is trained to play a strong role.

More cotton. By 1970 the Third Plan aims to produce 3.5 million bales of cotton, compared to a benchmark of 2.2 million bales in 1964-65. That is a 56% jump in 5 years and the Plan also aims to double export sales of cotton during 1965-70, from Rs.140 to Rs.300 crores.

Pakistan already produces good cotton. It has capable cotton farmers. These farmers already know how to use fertilizer. But there are many changes needed in the next five years.

Plant population is too low per acre. Some farmers still do not practice row cropping. Plant protection is inadequate. Adequate plant protection alone could double the yields per acre. To help the farmers make these changes is the responsibility of the extension service.

More maize. The Plan target for increased annual maize production during 1967-70 calls for a jump of more than 50%, from a bench-

mark in 1965 of about 500,000 tons to 770,000 tons in 1970. This is primarily an extension problem.

The research service has spent 10 years developing acceptable varieties of hybrid maize, and many research officers were trained abroad for this purpose. Good seed is now available, but for many reasons, production has not increased as it should. On private farms, the plant population of maize per acre is too low. Fertilizer use is inadequate. Weed control is poor. Control of the corn borer is not effectively achieved. Yet answers to these problems are known. The extension officers need special training if the Third Plan target is to be met.

More mechanization. More than 5000 private tractors were added to farms in West Pakistan during 1960-65, I am told. The increased mechanization in the next five years will be even greater, partly made possible by the recent World Bank loan for farm mechanization. Most of the present private tractors in West Pakistan are being under-used -- that is, they serve only for plowing and hauling, and stand idle much of the year, because of the lack of proper implements for many operations.

The majority of extension officers with whom I talked were not trained to give advice to farmers on the better use and maintenance of farm machinery.

In those areas where the largest amount of machinery is being introduced, it would be desirable for the Agricultural Machinery Organization to give special training classes for extension officers, covering the basic problems of farm mechanization.

Japan's example. As I look around Asia to see what is happening to agricultural extension in other countries, it is no accident that Japan, with the highest ratio of extension officers (1 officer for every 600 farm households) is also the highest agricultural producer in Asia, and in many crops, has the highest yield per acre in the world. Pakistan must move in that direction.

But the immediate problem for the Pakistan extension service is not increasing its staff. Emphasis must now be on quality. During 1965-70 the problem is to find better extension methods, contributing directly to the production targets of the Third Plan, and give the extension officers the special training, in close association with the research service, to enable them to play the strong role which is required of them in 1965-70.

2. What is effective extension?

During my 35 years as administrator and trainer of extension officers in the United States, and in other countries, I have seen many revolutionary changes in agriculture, to which extension work contributed.

This experience has taught me that there are a few sound principles for agricultural extension work, and these principles are important in any country, any climate, any language, any culture.

Since the judgments in this report are based first of all on my past experience, let me start by stating the fundamentals.

Farmers are wiser than most of us would realize.

A farmer may have little formal education, or be illiterate, but he can figure the difference between profit and loss in farming better than most college graduates.

Therefore, if a farmer tries a new seed, or crop, or cultural practice, and finds it is not profitable, don't argue with him. He is probably right, under existing production conditions. The first principle to guide a good extension officer is a respect for the homely wisdom of the farmer, a courtesy in dealing with him, a willingness to listen to production problems as the farmer sees them, and to help those farmers who are trying to increase their production.

A farmer won't adopt a new seed, or new crop, or new method unless it is clearly profitable. An extension officer cannot be effective unless he has a reputation as being available to recommend.

In Pakistan, fluctuations of weather from year to year can cause ups and downs of crop production, by the individual farmer, of

at least 25%. Therefore, if the extension service asks a farmer to try a new seed which is 10% better than the old seed, the farmer will not easily be able to see the difference, and the spread of the new seed will be slow.

But if you offer a farmer a new seed which is 50% more profitable, the extension service will get rapid results.

(This explains why Mexican dwarf wheat spread in less than 10 years to almost every farm in Mexico, and why private tubewells have spread so rapidly throughout the Punjab during 1960-65. Both are highly profitable).

Agricultural extension is most essential, and most profitable, in a country where new "inputs" are being made available to the farmer -- that is:

- New irrigation water
- New fertilizer sources
- New research results, such as new crops, or new varieties
- New machinery
- New plant protection methods
- New sources of credit

New 'inputs' increase the yields per acre and thus make farming more profitable. But they also require a farmer to change many of his old cultivation practices.

Agricultural extension helps to spread the scientific use of new "inputs".

Agricultural extension is least useful in a static, traditional agriculture, where new 'inputs' are not available.

New farm practices will always be tried first by a few progressive farmers, and other farmers will later imitate the early adopters. Extension workers must learn who are the most progressive farmers, and concentrate their efforts on them.

The "progressive farmers" are not necessarily the richest, or best educated, or largest landowners.

The extension worker will soon find which farmers are eager for new ideas, and that is where the extension man's energy will produce the most results. The progressive farmers become the demonstrators for the extension service. In fact, they are unpaid officers of the extension service, when given the necessary technical information.

Don't try to introduce too many changes at one time. Choose a few important crops. Recommend a few key production changes each season. Divide your message on those crops into a few simple rules. Then concentrate the message on the progressive farmers.

For example, if the extension service in Multan District wants to concentrate on long staple cotton for the next Kharif season, it needs to decide only a few key rules: what variety of pure seed, what seedbed procedures, what fertilizer, what irrigation practice, what plant protection schedule. And repeat that information over and over to the progressive farmers who are chosen as demonstrators.

The second year more ideas can be added.

Concentrate all your effort on a few target crops.

An extension service must have a day to-day contact with a research service. This close contact is necessary for both.

Without a close relationship, the extension man cannot get the answers to new problems of the farmer.

And without this relationship, the research service cannot plan its investigations so as to meet the specific local problems of the farmer.

This relationship needs further strengthening in West Pakistan.

An extension man at the village level (Field Assistant) is effective only if he is part of a team, which includes his supervisor (EADA), his counsellor (District Agricultural Assistant), a group of technicians available on call (specialists from the research service), and a group of progressive farmers who serve as demonstrators.

This teamwork can move technical information rapidly from the research station to farmers.

Without this teamwork, the sub-professional agent in the village, working alone, is incompetent for the job, and his morale drops.

The role of your Field Assistants reminds me of my own early days as an Assistant County Agent (lowest level extension officer in the United States). I had grown up on a farm and had a college degree. I was full of book learning. But I lacked confidence when approaching a mature experienced farmer. Fortunately, I had a counsellor who was a veteran county agent. He helped me to learn on the job. I could turn to him for advice. He helped me profit from mistakes. With such leadership and counselling, even the youngest and most inexperienced extension officer soon learns to give technical information which farmers need and appreciate.

In a country where agriculture is beginning to change rapidly, as in West Pakistan, extension workers must attend regular refresher courses. New problems will always arise in each cropping season.

In service training of some sort is needed year after year, throughout a man's career. It is never finished.

A good extension man deserves rewards, by periodic pay raises, by promotion to higher position as opportunities occur, and by distinguished service certificates, possibly issued by the District Council, the Secretary of Agriculture, or the Governor.

There is nothing more demoralizing to an extension worker than to discover that the lazy man gets the same rewards as the energetic and successful man.

The extension service needs a deliberate policy of identifying the best officers, and finding ways to show the Government's appreciation.

To sum up

The above working principles for extension are equally important in the United States, and in a country which is just entering the revolution of scientific agriculture.

Without the above principles, I have never seen an extension service succeed.

With faithful application of the above principles, I have never seen an extension service that did not pay for itself, many times over, in increased production.

3. How is the West Pakistan Extension Service
Working in 1967

Agriculture Department at Lahore is the "mother extension service" of West Pakistan -- the service which is oldest, largest, and supplies most of the extension staff for three other agencies. In my inquiries how the service now operates, I found it necessary to approach four different Government agencies:

Agriculture Department, directing extension in 40 settled districts, with 3,000 extension employees.

Agricultural Development Corporation, responsible for extension in two new irrigative areas, the Guddu and Ghulam Mohammad Barrage projects, covering parts of seven districts, with 23 extension employees.

Land and Water Development Board, responsible for the experimental reclamation project, CCA P-1, with 225 extension employees.

Home Department, supervising extension in part of the tribal areas, with 113 extension employees.

All told, there are now about 4,400 supervisors, agents, and supporting technicians engaged in extension work, at a total annual cost of Rs.2.6 crores (\$5.5 millions). This is a major investment, and deserves careful study whether the staff selection, training, supervision, and extension methods, are contributing to increased harvests.

On the following pages a map shows the approximate areas of jurisdiction of each of these extension organizations, and five tables show the personnel strength and organization of the four extension systems.

About the author

Mr. C.A. Svinth has been involved in extension work for 35 years as administrator and trainer of extension workers, both in the U.S. and in other countries. He retired in 1965 as Director of Extension at Washington State University.

The Secretary of Agriculture, Lahore invited Mr. Svinth to study the extension service of West Pakistan, and to recommend ways to strengthen the service through better training.

During September-November 1965, Mr. Svinth travelled through the three agricultural regions of West Pakistan, inspected all training institutions, and discussed problems with scores of extension field workers and farmers.

This paper is a summary of Mr. Svinth's observations and recommendations to the Secretary of Agriculture.

Lahore
November 1965

Strengthening Agricultural Extension in West Pakistan

1965-70

by

C. A. Svinth

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Secretary of Agriculture, Lahore

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Planning Cell
Department of Agriculture
Government of West Pakistan
Lahore

Table 1

AGRICULTURAL EXTENSION SERVICES IN WEST PAKISTAN
Staff, budget, and coverage, 1964-65

Agency and Region	Staff strength			Specialists at Dist.HQ	Agric. Assts.	Field Assts.	Staff total	Annual Budget Rs.lakhs	Area served (lakhs acres)		
	DDA's	Specialists at Div'l HQ	Asst. Directors at Dist.HQ						Geographical	Cultivable	Cropped*
<u>Dept. of Agriculture</u>											
Peshawar region	3	24	10	30	106	584	757	44.7	158.6	65.2	61.8
Lahore region	4	32	15	53	242	1629	1975	101.7	437.0	212.8	202.2
Hyderabad region	4	32	15	44	174	795	1066	75.6	1038.0	100.0	62.2
Total	11	88	40	127	522	3110	3798	222.0	1634.0	378.0	326.2
<u>Agricultural Develop. Corp.</u>											
G.M. Barrage	1	6	3	-	24	70	104	10.0	33.9	20.3	12.3
Gudu Barrage	1	7	4	-	36	121	169	10.9	30.1	20.4	22.6
Total	2	13	7	-	60	191	273	20.9	64.0	40.7	34.9
<u>Land and Water Develop. Board</u>											
SCARP-1	1	-	3	4	17	200	225	16.6	12.1	9.7	11.7
<u>Home Department</u>											
Tribal areas	1	3	3	11	23	72	113	5.6	NA	NA	NA
Grand Total	15	104	53	142	622	3473	4409	265.1	-	-	-

*Cropped acres (last column) represents total cropped acre for all seasons, added together. If one acre is double cropped, it is shown here as two acres.

Table 2

Agriculture Department
Extension Service Organization, 1965

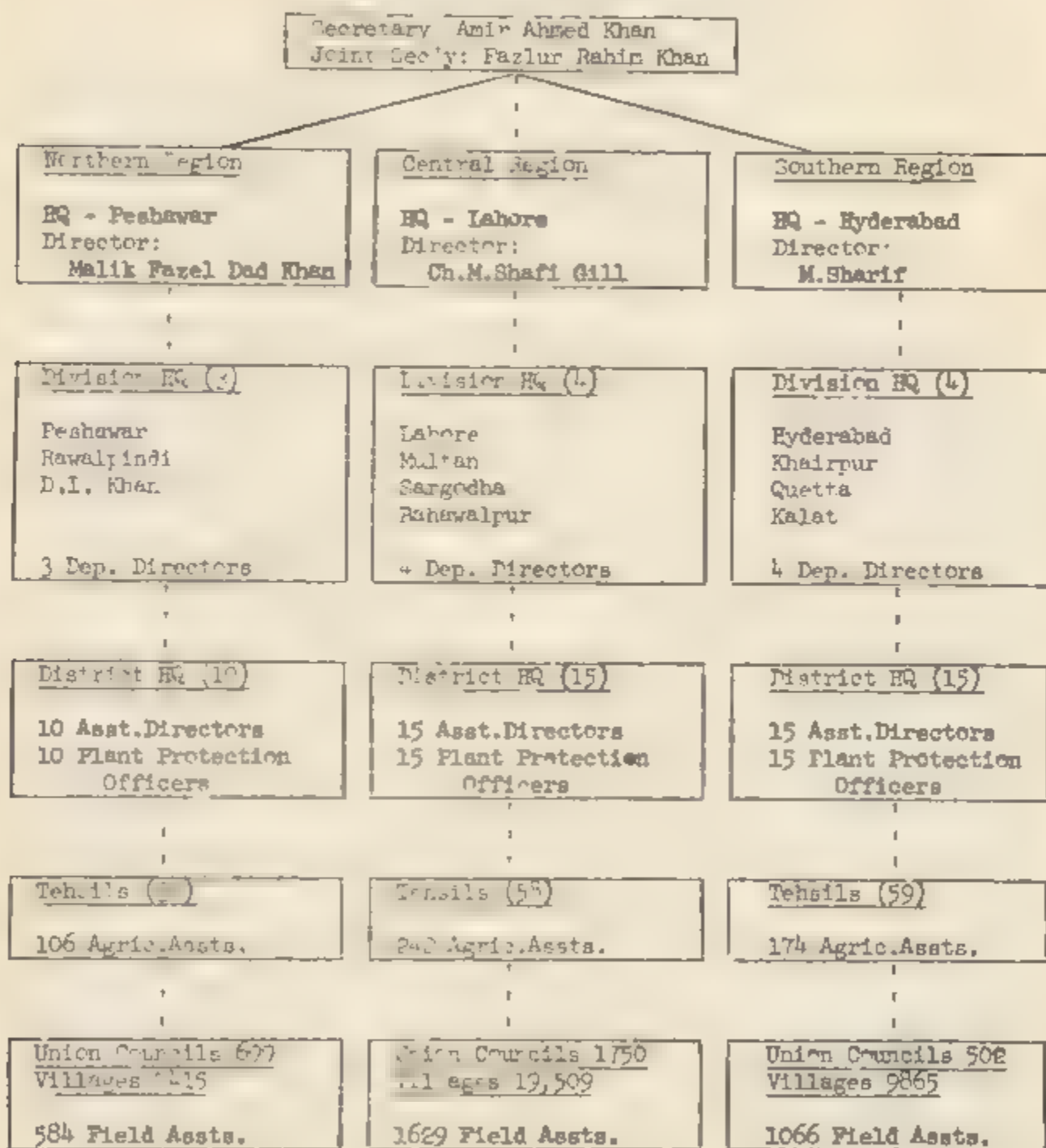


Table 3

Agricultural Development Corporation
Agricultural Extension Organization 1965

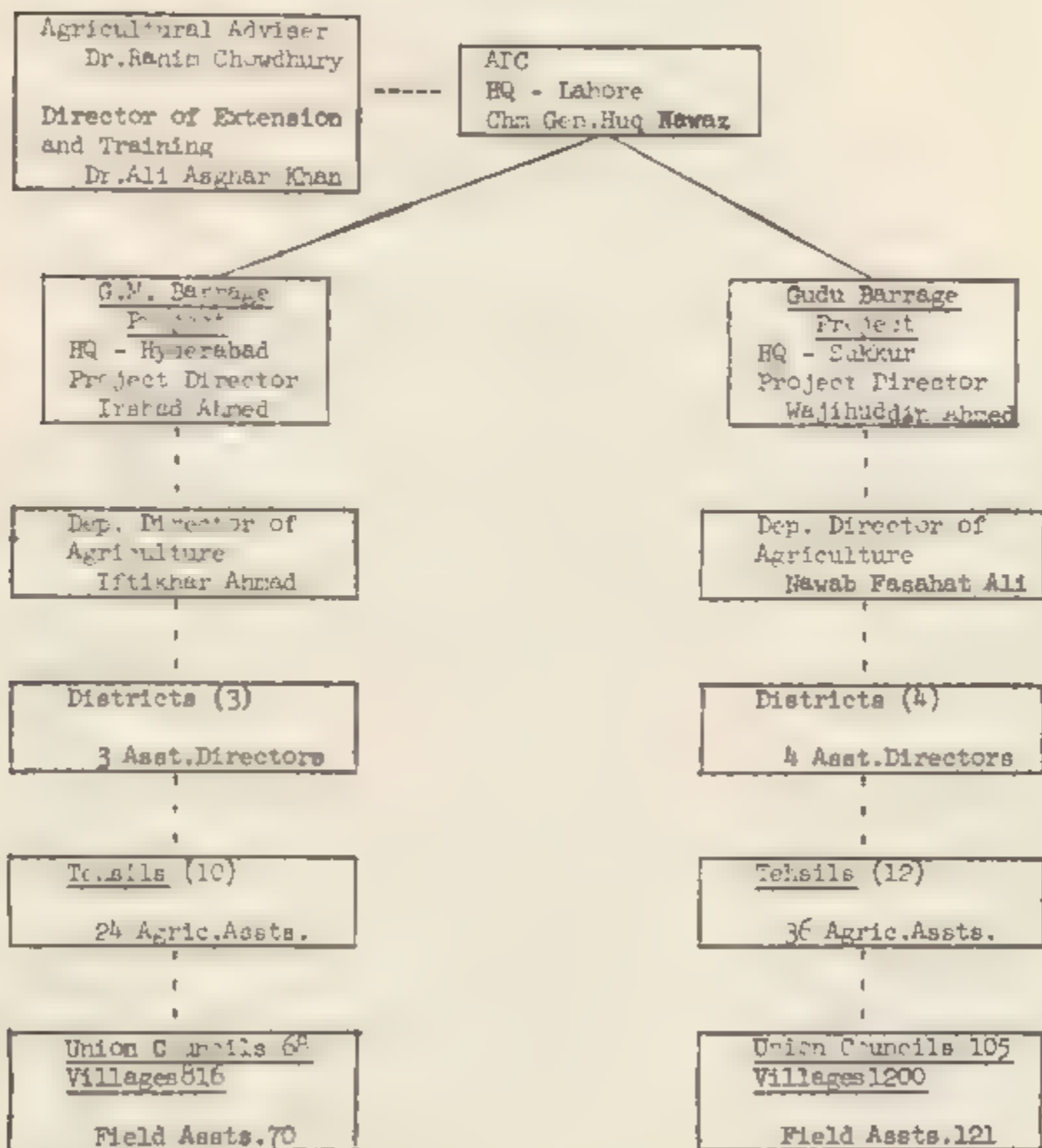
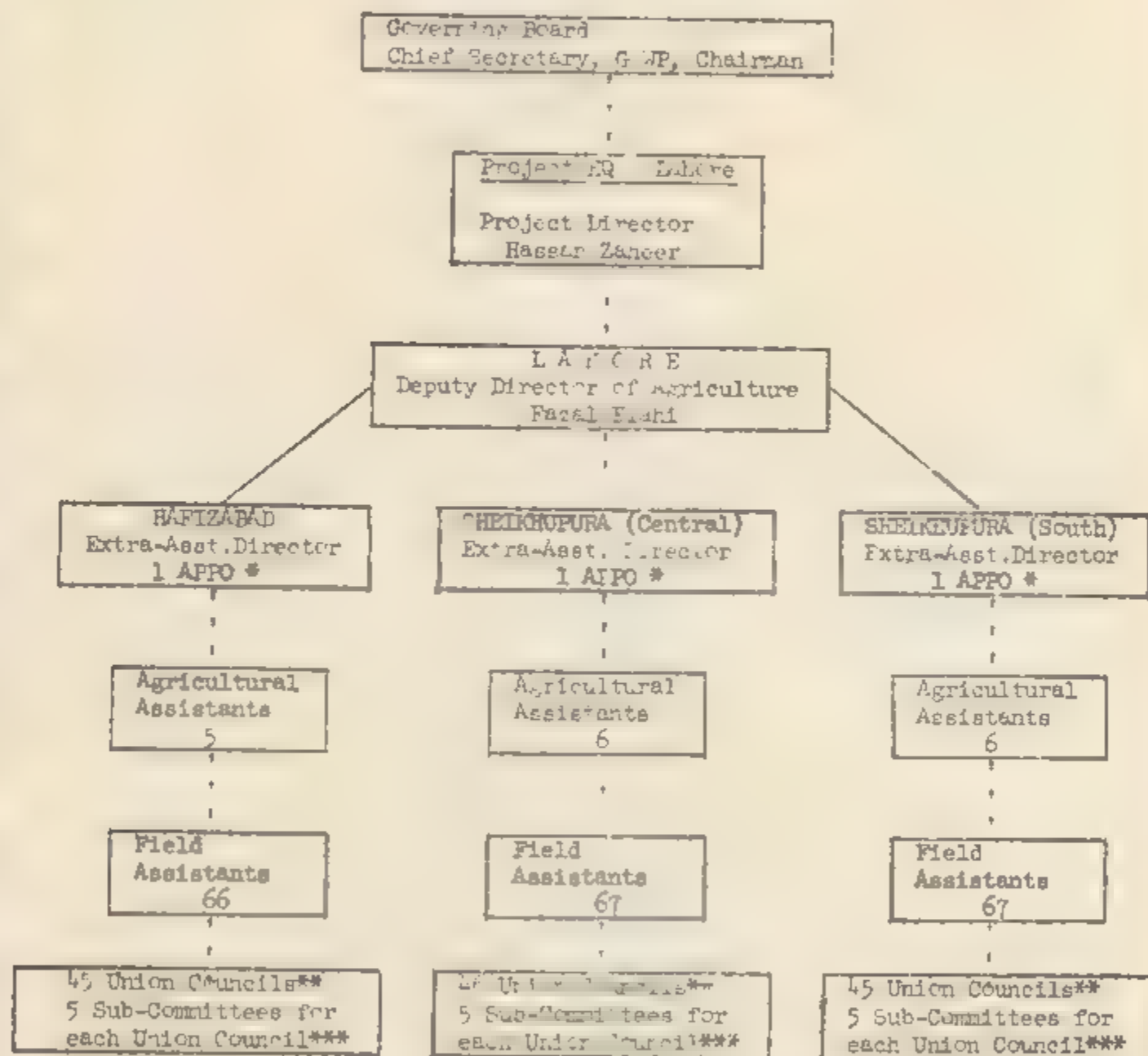


Table 4

Land and Water Development Board

SCARP-I Extension Organization, 1965



* Assistant Plant Protection Officer

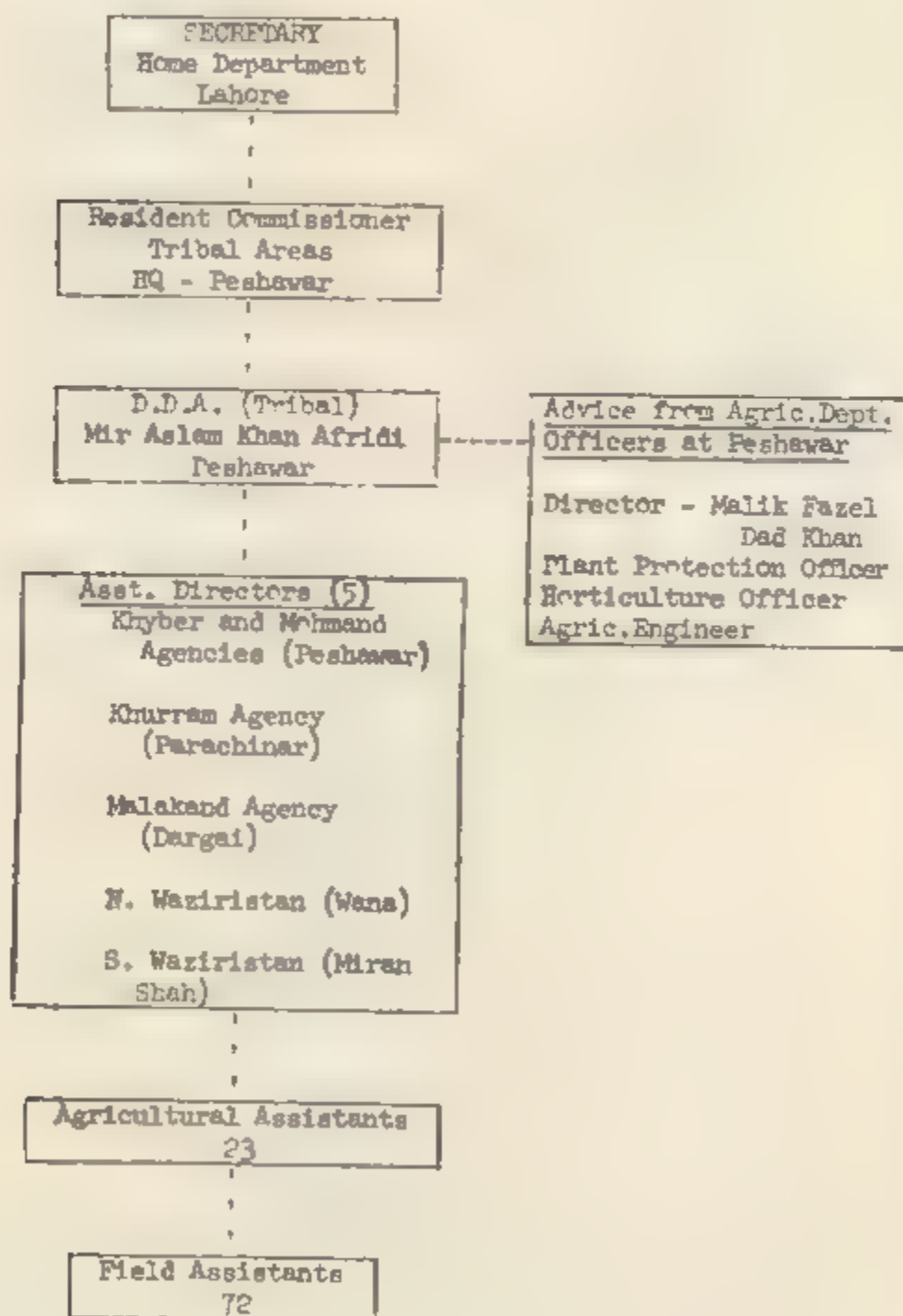
** Estimated - sometimes, $\frac{1}{2}$ Union Council comes under the jurisdiction of one EADA

- ***
1. Fertilizer
 2. Irrigation
 3. Crops
 4. Plant Protection
 5. Credit & Marketing

Table 5

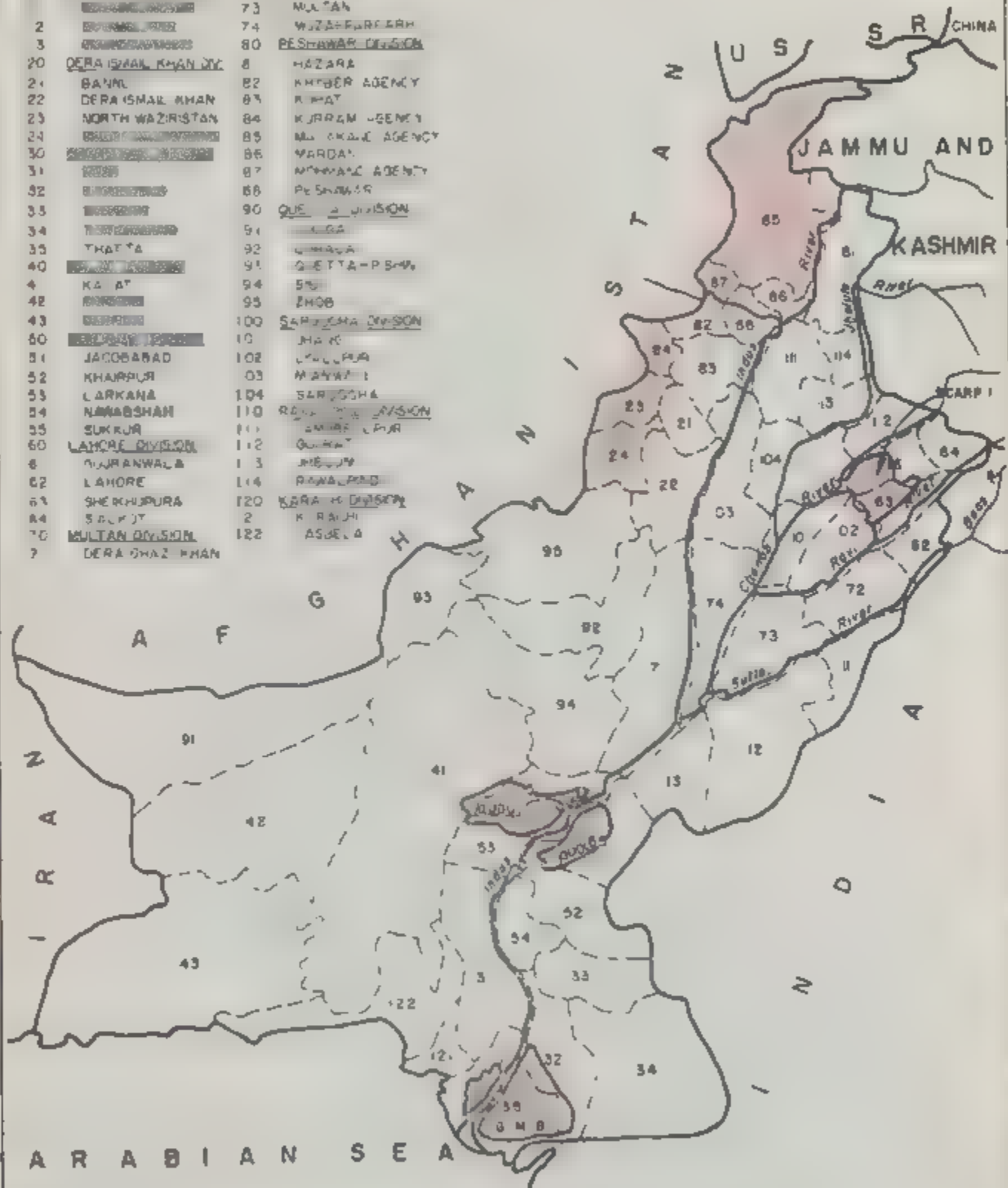
TRIBAL AREAS

Extension Organization 1965



WEST PAKISTAN

DIVISION/DISTRICT	CODE	DIVISION/DISTRICT	CODE
0	72	WATGOMERY	
2	73	MULTAN	
3	74	WUZHAFERARRH	
20	80	PESHAWAR DIVISION	
21	81	HAZARA	
22	82	KHIBER AGENCY	
23	83	KHAT	
24	84	KURRAM AGENCY	
30	85	MUJAWA AGENCY	
31	86	MARDAN	
32	87	MIRANSHAP AGENCY	
33	88	PESHAWAR	
34	90	QUEZIL DIVISION	
40	91	QUETTA-PESHAWAR	
41	92	QUETTA	
42	93	QUETTA	
43	100	SARAYKHA DIVISION	
50	101	JHARK	
51	102	CHITRA	
52	103	MAYWAL	
53	104	SARAYKHA	
54	110	RAJASTHAN DIVISION	
55	111	CHITRA	
60	112	QUETTA	
61	113	CHITRA	
62	114	RAJASTHAN	
63	120	KERRA DIVISION	
64	121	KERRA	
70	122	ASBELA	
71			



Agricultural Extension Organizations, West Pakistan

- White areas = Agriculture Department
- Red areas = Agricultural Development Corporation (G.M. and Goda Barrage Projects)
- SCARP-1 Project
- Tribal areas under Home Ministry

Rapid expansion, 1960-65

At the start of the Second Five Year Plan in 1960, the information given me shows 2,700 employees engaged in extension in the Agriculture Department (the combined strength of Extension and Plant Protection Services, which were subsequently merged), and 100 in the Tribal Areas Service.

By 1965, this staff rose to 4,400 an increase of more than 50% in five years. Such rapid increase will cause growing pains in any Government. The key problem for the Third Plan, 1965-70, is to consolidate, to improve the competence, not to increase the size.

Role of the sub-professional (non-graduate)

According to the employee strength given me by each extension organization, the relationship of college graduates to sub-professionals in 1965 is approximately as follows (all services combined):

<u>Gazetted officers I and II</u>		
(all college graduates generally with 10 or more years of Government experience)		
		300
<u>Agricultural assistants</u>		
(college graduates, generally with less than 10 years experience, and most often stationed at the tehsil level)		
		600
<u>Field assistants</u>		
(sub-professionals, matriculates with generally one year of agricultural training)		
		3,500
	Total	<u>4,400</u>

These figures show that sub-professionals comprise 80% of the extension force, and college graduates 20%. There are 900 college graduates and 3,500 sub-professionals. College graduates have an average of four non-graduates working under them.

I fully understand the necessity. West Pakistan does not have enough college graduates to staff its extension service with degree holders at the lowest level, and will not have enough graduates within the next 10 years to replace the present Field Assistants with college graduates. Effective ways must be found to select, train, and use sub-professionals as the backbone of this extension service.

This can be done. Countries like the Netherlands and Norway have built their extension services primarily on sub-professionals at the lowest level and have achieved highly productive systems of agriculture.

But the present use of sub-professionals in West Pakistan is not bringing full results. I realize the performance varies widely. Some progressive landowners told me they never see the Field Assistant assigned to their area. Others told me that the Field Assistant is not trained well enough. Some Field Assistants themselves told me that they had only infrequent contact with the Agricultural Assistant (graduate) working immediately above them, and were not receiving a steady flow of new information to answer farmers' questions. Some of these criticisms are unquestionably related to the excessive areas assigned to many of the officers, and the lack of transport vehicles.

I am confident the Field Assistant, on average, can be used to better advantage, but he cannot do it alone. My suggestions both on program and training come later in this report.

What extension methods are now used?

As I moved about West Pakistan, I spent the working day with a number of Field Assistants and Agricultural Assistants, to observe

their extension methods. There is a wide difference between men but I feel safe in generalizing that most of their time is devoted to the following activities:

- (1) Plant protection. Half or more of the total time of the Field Assistant is devoted to plant protection -- scheduling the work, arranging supplies, supervising the holders, talking to farmers about the problems and results of plant protection. This is a very high price to pay for a service that reaches (according to the Third Five Year Plan) only 12% of the crop in 1965 and only 19% of the crop by 1970.
- I was told the Government found it necessary to launch the plant protection work as a Government service, because dangerous chemicals are involved.

But the present system has served its introductory purpose and can never accomplish the complete job -- there are not enough men, or supplies, or funds. The spraying is often poorly timed and poorly done, because of thin staff.

Later in this paper, I offer my suggestions how the plant protection responsibility can be shifted gradually, and safely to private farmers, and the extension staff can then concentrate on advice and training of farmers.

- (2) Model farms. A very large amount of time of both the Field Assistant and the Agricultural Assistant is going into one or two model farms.

The idea behind this activity was to make one farmer a demonstrator, who would apply all the latest ideas to his entire farm, with assistance of the extension staff, and the ideas would then be diffused to the neighbors. Field days have been held at many Model Farms.

But no successful extension system in the world has concentrated its efforts so heavily on so few farms.

Experience in other countries, and in East Pakistan, would argue that it is more productive if each Union Council were to have 10 or more demonstrators, each applying the latest ideas to only a part of his farm -- even 1 acre. The diffusion of ideas by this technique has produced faster change in agriculture.

The Model Farm has served a useful introductory purpose. It is time for a change to a more widely dispersed system.

Later in this paper I offer my proposals for multiple farmer-demonstrators.

- (3) Answering questions from farmers. Each Agricultural Assistant and Field Assistant is expected to answer questions from farmers on a wide range of questions on new cropping techniques, services of other Government agencies, which offer fertilizer, improved seed, machinery, credit.

Some officers are looking after this assignment very well but so much time is generally consumed on plant protection and model farms that little time remains for contact work, which is the backbone of successful extension.

Does the chain-of command provide adequate supervision and flow of technical knowledge?

As I interviewed extension officers, I kept asking myself three questions:

- (1) Is there adequate supervision?
- (2) Is there adequate flow of technical knowledge?
- (3) Is the sub-professional worker at the bottom of the chain of command working alone, without adequate support at the Union Council level?

My answers to these questions suggest deficiencies in the service. I hesitate to answer these questions frankly.

Supervision is weak, especially at the district and tehsil level. EADA's are bound to their desks by paper work, far more than good extension men should be. They should spend one or two weeks each month on tour. I found EADA's who had not visited all their Agricultural Assistants for several months. I found Field Assistants who had not worked jointly with their Agricultural Assistant for six months. These may be exceptional cases.

Transport is part of the problem here, as it is in all extension services. The Field Assistant can manage with a bicycle, and generally does. But the most critical transport problem is that of the Agricultural Assistant, who frequently is assigned a working area with a radius of 15-30 miles, yet only 60% of the tehsils have any vehicle for extension, I am told. In the next chapter I discuss the more equitable sharing of vehicles.

Technical knowledge is flowing sporadically from the research service, and the Agricultural Information Service, to the front line extension officers. This flow deserves far greater attention, especially on those crops which are receiving primary emphasis under the Third Plan.

The technical specialists attached to the District office, generally only one plant protection man and one horticulturist, cannot give the amount of technical support needed. Some are not in close enough touch with the research institutes. Some do not appear to spend as much time as they should giving support to the lower extension staff, as their assignment calls for. But the major problem is an insufficient number of specialists. There is urgent need for several other technicians at the District headquarters, especially a crop agronomist, an irrigation water use specialist, a farm management specialist, and a machinery man. These are essential in those districts where introduction of new crops or new varieties is taking place. If men and funds are not available for such expansion immediately, the system should be tried at least in the most critical districts, or even at division headquarters, and expanded when resources permit.

The sub-professional Field Assistant, as a result of the above deficiencies, has been struggling very largely on his own, often out of touch with the organization above him, with inadequate basic training, with little access to technicians. But many of these Field Assistants are quick learners, with real dedication. I believe short periods of retraining, and more leadership, can soon produce better results.

Agricultural Development Corporation (ADC) Extension System

Since A.D.C. was established in 1961, it has been given the agricultural extension assignment in the following project areas:

<u>Project</u>	<u>Crop acres in use 1965</u>	<u>Agricultural staff 1965</u>
GM Barrage, Sind	12,33,000	10
Gudu Barrage, Sind	22,60,000	170
Total	34,93,000	270

Nearly all the agricultural officers working for A.D.C. were drawn from the mother service of the Agriculture Department, hence their training and knowledge is substantially similar. One major difference in organization is that each A.D.C. project involves opening up new lands, and colonization, under the direction of a project manager. Therefore, extension work is focused on new lands and newly settled farmers.

Because of its pioneering work with new farmers, A.D.C. has experimented with farmer training, and now has more experience in this field than does the Agriculture Department. A.D.C. farmer seminars are generally one week in duration, held at Union Council

headquarters, and the farmers receive Rs.10 per man for expenses. Teaching is done by extension specialists. More than 70 such seminars were held during 1964-65, I was told.

Another pioneering development in A.D.C. is the establishment within their project areas of training centers for farmers' sons. Ten centers are authorized to date, and five in operation.

Each center consists of a boarding institution for about 60 boys, and a 100 acre farm, where the boys are given one year of practical training, then they are expected to go back to help on the family farm. The age of admittance in some centers is 12-15, in others 19-20. All boys admitted have had previous schooling, ranging from 3 to 6 years.

A.D.C. has pioneered in another activity. In G.M. Barrage area a group of 20 farmers who were introducing the first jute crop in that area, were given a 12-day observation trip, at Government expense, to East Pakistan to see jute production.

A.D.C. also pioneered in a 4-week training course for Agricultural Assistants, which offers some experience on which to base a wider training program for the Agriculture Department.

SCARP-1, another extension system

The 1.2 million acres in SCARP 1 were assigned in 1963 to the supervision of the Land and Water Development Board, a semi-autonomous body which controls both water management and agricultural extension in this experimental area near Lahore.

SCARP-1 (abbreviation for Salinity Control and Reclamation Project) inherited its extension staff from the Agriculture Department, but it has experimented with the extension organization in the following ways:

- (1) Assistant directors (EADA) have been tripled. There are three in the area equal to one district.
- (ii) Field assistants have been increased in number compared to the Department of Agriculture organization (about 1.5 per Union Council, instead of one.)

These staff changes mean that SCARP-1 areas has about double the extension workers per million cultivated acres, or per 1000 farmers, compared to the Agriculture Department areas. This staff increase has an important bearing on the changes in extension methods.

SCARP-1 is experimenting with modified extension methods which involve the following:

- (1) It concentrates all efforts on increasing yields per acre of 5 crops -- wheat, rice, cotton, maize, and sugar cane.
- (2) Union Councils are asked to form voluntary crop production committees, and to help the Extension Service select the demonstration farmers for each crop. The extension workers then concentrate all their efforts to introduce improved production methods on a few acres of each demonstration farm. More than 5,000 such demonstrations were organized in SCARP-1 in 1964-65. (On the average there were 40 demonstrators per Union Council.)

- (3) At the beginning of each season, all extension workers from EADA to the Field Assistant are subjected to a 1-week training course on what methods would be used on the demonstration farms. A printed Urdu leaflet, prepared jointly by the Research Service and the Agricultural Information Service, is ready for each crop. This leaflet is studied in the training course, and later given to the demonstration farmers.
- (4) EADAs and Agricultural Assistants worked jointly with the Field Assistants on these demonstration plots. In no case was the Field Assistant expected to work alone, without close collaboration from a graduate officer.
- (5) The demonstration farm is used as the basis of field days, at the end of the season, and prizes are awarded for the highest yields per acre.
- (6) In the second season, each "demonstrator" is asked to recruit and train 10 additional farmers in the same methods.

In SCARF-1 a wheat crop harvested in the spring of 1965 averaged 26.95 maunds per acre on the demonstration plots, compared to 13.77 maunds on check plots which did not receive the attention of the demonstration farmers. This was a gain of about 100 per cent in yield per acre. It shows what good extension work can accomplish in an area which is fighting salinity.

I asked to see the seven-point program which the wheat demonstrators had used to produce this double yield. The farmers had received the instructions in Urdu, but I was given the following English translation of the seven steps:

- i) Plow land 4-6 times and use sohaga (leveller) 2-3 times to provide good seedbed for germination.
- ii) Plant recommended variety of seed.
- iii) Sow wheat between October 15 and November 15.
- iv) Use rabi drill or pona.
- v) Apply two bags of Nitrogen and one bag of phosphate.
- vi) Irrigate three or four times.
- vii) Keep field free of weeds.

That is the kind of simple, low-cost program which SCARP-1 extension officers have devised for each of their five crops, and each crop has shown a similar jump in yield.

This type of program has been tried by some DDA's and EADA's in the Agriculture Department. The SCARP-1 method deserves wider study, and a similar method, adjusted to the separate technical needs of the 3 regions of West Pakistan, needs application in every district.

4. What Pattern of Extension Does West Pakistan Need in 1970?

Before extension officers can be retrained, the question must be answered: What kind of extension service do you need in 1970? Whatever the answer, retraining will be directed toward that end.

The three Regional Directors of Agriculture are the men who should outline the pattern of extension toward which the province will move during 1965-70. I have talked to each of them.

I offer below my present judgment on the eight most important elements of the new extension pattern for 1970. These ideas are not new with me. All of them were suggested by agricultural officers. All of them are now in practice in parts of West Pakistan. But these eight elements need to be discussed, understood, approved, spread to the entire province, and incorporated in the training program.

The eight key elements are summarized as follows:

- (1) Thousands of crop demonstrations will be needed on private farms, replacing the previous concentration on a small number of model farms. These demonstrations should be limited to a few key crops.

The farmers who offer their land for these demonstrations will become the leaders of the agricultural revolution in West Pakistan, and the extension service will use them in many ways. They will be your unpaid extension agents at Union Council level.

- (2) A regional work plan for each crop will be drawn up at a conference of Regional Director PDAs-EADAs before the start of each cropping season.
- (3) A district training seminar will then be held, at which EADA, Agricultural Assistants, and Field Assistants study the work plan, and set their local targets. (This has begun).

- (4) A Union Council training-seminar for farmer-demonstrators will be held before each planting season, at which farmers will study the demonstration plan, receive technical guidance, and develop a spirit of competition. (This now occurs in some districts. It needs to be standardized).
- (5) To strengthen supervisory, some changes are very desirable in extension staffing pattern. I recommend
 - (a) More technical specialists at District headquarters.
 - (b) One gazetted officer in each tehsil, replacing one Agricultural Assistant.
 - (c) A small increase in the number of Agricultural Assistants, to permit each Agricultural Assistant to supervise no more than five Field Assistants.
 - (d) A new cadre of Senior Field Assistants, comprising up to one quarter of the Field Assistants, who would be awarded this promotion only after proving superior performance, and would then receive extra pay.

If financial considerations do not permit the above changes now on a province-wide basis, they should be introduced immediately at least in the key commercial cropping areas, such as Multan, Lyallpur, Montgomery, and Rahim Yar Khan Districts, and then expanded as soon as budget permits.

- (6) A closer working relationship between Agricultural Assistants and Field Assistants is required at the Tehsils and Union Councils. The sub-professional should not be asked to handle demonstrations alone.
- (7) Better technical information must flow continuously to all levels of the extension system, and down to the farmer-demonstrator. That means new relationships for:

Agricultural Research Service
Agricultural Information Service

- (8) Plant protection responsibility should gradually be shifted to the private farmer, leaving the extension officer more time for his primary job -- organizing crop demonstrations.

The regional Director of Agriculture, as I stated above, is the man to decide the new pattern of extension toward which the Agriculture Department is moving during 1965-70. I urge that the above eight points be discussed among them, that some agreement be reached as soon as possible, that retraining of extension officers then begin. In order to facilitate this discussion, I expand below my ideas on each of these eight elements.

1. Crop demonstrations

The EADA and Agricultural Assistant should select the farmer-demonstrators, but only after consulting the Union Councils, for the following reasons:

- (1) Union Councils know who the better farmers are.
- (2) Union Councils can add prestige and publicity to the new emphasis on farmer-demonstrators.
- (3) By involving Union Councils in agricultural extension, you strengthen the role of Basic Democracy in rural development.

For Kharif and Rabi seasons of 1966, a minimum target should be set of 10 farmer-demonstrators for each Union Council (or at least one per village). That means at least 35,000 demonstrations in West Pakistan for each season of 1966. By 1967 the target might be doubled (i.e. at least two per village).

Each demonstration needs to be a plot of no more than one to five acres. Eventually some of these demonstrations will cover entire farms, representing hundreds of acres in one demonstration.

A demonstration should always provide a check plot for comparison with new practices, planted side by side, to teach the farmer the advantages of new practices. The demonstrations which are now being organized for Mexican dwarf wheat on private farms in West Pakistan serve as a good illustration. The sketch below is from a report by Dr. Norman Borlaug, Specialist on Mexican dwarf wheat.

Semi-commercial demonstration on private lands of Mexican short wheat

Tall wheat local variety	Mexican Short wheat	Total area two acres
Local fertilizer practice	60 pounds Nitrogen 40 pounds P_2O_5	
1 acre	$\frac{1}{2}$ acre	
	Mexican Short wheat	
	120 pounds Nitrogen 40 pounds P_2O_5	
	$\frac{1}{2}$ acre	

From observing the above demonstration on his own land, the farmer will easily reach conclusions which will influence his planting for the following year. And if neighbors have been invited to attend a field day at the demonstration, they too will be influenced.

When organizing these demonstrations, a shortage may sometimes occur in the local supply of improved seed, fertilizer, or plant

protection chemicals. The extension officer should make certain that the farmer-demonstrator is given priority in obtaining supplies.

Competition between farmer-demonstrators should be encouraged. Field days can be held for crop cutting on the land of the farmer-demonstrator. Recognition should be given by the Deputy Commissioner and the Governor for the highest yields in each Union Council, each district, and each region, through wide publicity. Cash awards have been suggested but are probably unnecessary.

By the second year, every farmer-demonstrator, should be asked to recruit and train additional farmer-demonstrators and teach them the same methods.

By 1970 it is possible that every commercial farmer in West Pakistan (that is, every producer of a crop surplus for cash sale) should serve as a farmer-demonstrator in some crop.

2. Regional work plan

About 60 days before the start of each cropping season, the Director-2DAs-EADAs should meet at regional headquarters to draw up the demonstration plan for each major crop.

This meeting requires participation by the Research Service, the Agricultural Information Service, and the Agricultural Machinery Organization.

Each season demonstrations should be limited to a few crops, probably no more than 5. And work on each crop plan should be limited to a few key directives concerning:

- Variety of seed
- Sowing instructions
- Sowing rate, method, and timing
- Fertilizer rate, and timing
- Irrigation schedule
- Pest protection procedures
- Weeding procedures

An information bulletin should emerge from this meeting summarizing the technical information needed by the extension staff in each district, and by the farmer-demonstrators, for each crop. Preparing and printing this information bulletin could be assigned to the Agricultural Information Service.

3. District Training Seminar for the Extension Staff

The EADA presides over this one week seminar, which is one of the important methods of in-service training for the extension staff.

The seminar should be opened or closed by the DDA, to stress the importance which he attaches to this training. The seminar should be attended by liaison officers of the Research Institute, and by subject matter specialists from the DDA's office.

It would be useful also if this seminar could be visited by representatives of other agricultural organizations, who could brief the extension staff on special problems. These visitors might include:

- Machinery Organization (tubewells and tractors)
- Agricultural Development Bank (loan regulations and how to make loan applications)
- Agricultural Information Service (what bulletins and films are available)
- Agricultural Development Corporation (improved seed available)
- Co-operatives (fertilizer distribution plan)

The seminar should end with a specific target established for the number of demonstrations in each Union Council, and the officers present should indicate their acceptance of these targets.

4. Union Council training seminar for farmer-demonstrators

The first farmer seminars at Union Council level should be limited to the first year's farmer-demonstrators.

Each seminar should last 3-5 days, should be held at Union Council headquarters, or at a large farm within the Union, and should enable farmers to return home at night.

No cash payment is necessary to participants, but the Government might supply lunch each day. The best farmers are eager for new information, and do not require a cash reward to attend a training seminar.

The instructors should be the EADA, the technical specialists from district headquarters, and if possible, officers from research, ADC, and other agencies. The instruction should never be left to the Field Assistant alone.

After the first year's experience, the pattern of Union Council seminars can be modified to incorporate the suggestions of the farmer-demonstrators themselves.

5. Strengthening supervision through changes in staffing pattern

My recommendations for needed changes in staffing pattern are based upon proposals of many of your senior officers.

Technical specialists at District Headquarters should be a key resource for your proposed crop-demonstrations, and farmer seminars, and also for more intimate contact with the Research Service. ~~But~~ these specialists are now far too few in number - generally, just one plant protection man and one horticulturist.

I favor expanding these specialists at district headquarters, at least in those districts where major increases in crop production are expected. An agronomist, an irrigation specialist, and a machinery man would be the minimum additional skills required. These men should undergo special training at the Research Institutes every year, and thus bring the latest technical information much closer to the extension officer at the tehsil and Union Council level.

The Gazetted Officer at district level (FADA) is the most overworked administrator in the present system. Those in the largest and best farming districts (for example, Multan and Lyallpur) cannot possibly provide close supervision to the numerous Agricultural Assistants (as high as 25 per district). I therefore recommend that the Government introduce a Gazetted Officer in every tehsil, replacing one of the present Agricultural Assistants. This would provide more senior leadership in the tehsil, and relieve the district office of some of its present supervisory responsibility. I realize this change cannot be made quickly for the entire province, but it should be possible to try out the change immediately in the most important agricultural districts.

The Agricultural Assistant cannot provide effective leadership, in my judgment, for more than five Field Assistants. The present staffing pattern in the Agriculture Department indicates that each Agricultural Assistant is supervising the following number of Field Assistants:

Peshwar Region	...	5-6
Lahore Region	...	6-8
Synarbal Region	...	4-5

I therefore recommend that as rapidly as resources are available, additional Agricultural Assistants be provided for those tehsils where Agricultural Assistants are now supervising six, seven and even eight Field Assistants. For West Pakistan as a whole, this change would require 100 additional officers. The change should start in the districts which now produce the largest commercial surplus, because it is in these areas that the largest increases in yields per acre can be expected during the Third Plan.

A new cadre of Senior Field Assistants is recommended, because the present Field Assistants are discouraged by the lack of promotion opportunities. Some of them will remain Field Assistants throughout their entire career. The Agriculture Department could stimulate substantial increase in work performance by creating a new cadre entitled Senior Field Assistant, for which appointment would be made only by promotion within the service, on recommendation of a Selection Board. This cadre might be limited to 500-700 men, out of the 3000 Field Assistants now in the Agriculture Department. If the pay level were made Rs 50 per month above other Field Assistants,

this proposal would cost the Government about Rs.3-4 lakhs a year. I believe the results would be high.

If all these changes were made early in the Third Plan in a few districts, it should be possible to measure within a few years the advantages of stronger supervision, and thus justify the cost of extending these changes to the entire province.

6. Closer working relationship between Agricultural Assistant and Field Assistant

Earlier in this report I described the problem of the sub-professional Field Assistant, who has often been asked to work alone, without direct support of the Agricultural Assistant, and without a constant flow of technical information.

The primary assignment of the Agricultural Assistant, I submit, is to work several days each month jointly with each Field Assistant, making joint visits to the crop-demonstrators. This now takes place in a few areas. In most, it does not.

It should be possible for the Regional Directors to instruct every Agricultural Assistant to spend a minimum of two or three days each month with each Field Assistant under his supervision. In this manner, the Agricultural Assistant should get to know personally every farmer-demonstrator in his area.

This working method would be easier if the maximum number of Field Assistants assigned to an Agricultural Assistant were reduced to five (as recommended above).

Vehicles pose a problem. Every District Headquarters (EADA's office) now has several vehicles, but only 60% of the tehsils, I am told, have a vehicle for use of extension officers. In those tehsils where a vehicle is now available, it should be possible by equitable sharing, for Agricultural Assistants to engage in far greater joint activity with Field Assistants. In those tehsils where no vehicle now exists, the DDA will find it necessary to share his office vehicles more equitably.

Unless this teamwork between Agricultural Assistant and Field Assistant is achieved, I doubt the wisdom of using so many sub-professional personnel.

7. Flow of technical information

Your Research Service is the key to all new technical information needed by your extension officers and farmer-demonstrators. I doubt that the present twice-yearly meeting between top officers of the extension and Research Service is an adequate means of providing for two-way flow of information and problems.

I would earlier in this report that the Research Service should become involved in the District training seminars of the extension service, and that Research Officers be invited to accompany your senior extension officers on tour. Research officers should also share in laying out demonstrations of new crops on private land. They should receive copies of all tour reports by DDA's and EADA's.

The Agricultural Information Service has an able staff of officers in Lahore, who are under-used. The information staff should be invited to attend every regional planning session, and to prepare and print the bulletins which are needed for each crop season.

Already there are many useful bulletins available, but I found some out of date. They do not represent in all cases the latest information from the Research Service, and they are not closely geared to the new production targets of the Third Five Year Plan.

Your Information Service wants to be used, and can be.

8. Shifting crop protection service to the private farmer

Already you have been forced to cut back your funds for the plant protection service under the Third Plan, and I understand the number of beldars is to be reduced by 3000 in December 1955.

This will cause a temporary setback in plant protection, but I believe you can use this development for your long run advantage. The better farmers are already willing and able to provide their own plant protection service, under the guidance of your extension officers.

I talked to one cotton farmer near Sargodha, who told me that by doing his own plant protection, and using the same chemicals recommended by the Agriculture Department, he obtained 5 times greater crop than his neighbors who depended on the extension service for their plant protection. He said the difference had been achieved by proper timing, proper amount of chemicals, and more careful coverage.

This story is not typical, but it indicates that in the long run, West Pakistan can obtain greater benefits from plant protection if

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the responsibility can be shifted to the better farmers, who have greater incentives to do the job carefully, and at the right time.

By the end of the Third Five Year Plan, I visualize that the Government role in plant protection could be reduced to aerial spraying, but that all spraying and dusting on private farms would be the responsibility of the farmer.

5. Training Needs:

A. The Agricultural University and
two agricultural colleges as
trainers of extension officers

Having described your extension service as I found it in 1969, and the extension system West Pakistan will need by 1970, I now return to my primary assignment -- to advise on training needs.

It is beyond the scope of this report to examine the educational performance of the three institutions which award agricultural degrees -- the West Pakistan Agricultural University at Lyallpur, and the two agricultural colleges at Peshawar and Tandojam. Nevertheless, the ability of these three institutions to produce strong graduates for the Agriculture Department will determine to a large degree the quality of Government service. Information on numbers of recent graduates is given in Table 6 on the next page.

Except for a few officers who took agricultural training in India before 1947, all your 90 extension officers who hold agricultural degrees (total for all extension agencies) have studied in one of these three institutions.

While talking to Government agricultural officers who graduated from these West Pakistan institutions, I heard considerable praise, but also three commonly repeated criticisms, which, if true, are of importance both to the Extension Service and the teaching institutions.

Table 6

CAPACITY OF THE AGRICULTURAL UNIVERSITY
AND THE AGRICULTURAL COLLEGES

Institution	Output of Graduates 1965			Total Output During Second Plan Period, 1960-65			Projected Output For Third Plan Period, 1965-70		
	Bachelor's Degree	Master's Degree	Doctor's Degree	Bachelor's Degree	Master's Degree	Doctor's Degree	Bachelor's Degree	Master's Degree	Doctor's Degree
Peshawar Agricultural College	75	2	0	209	2	0	450	273	0
Lyallpur Agricultural University 1/	27 2/	54	0	519 3/	214	0	1035	475	43
Tandojam Agricultural College	30	37	0	252	118	0	460	359	0
	132	93	0	980	334	0	1945	1107	43

1/ Figures for Lyallpur University exclude 1960-61, when the University was still a college affiliated to Punjab University, and information on degrees awarded in 1961 is not available.

2/ Normal number of Lyallpur bachelor degrees awarded per year during 1961-65 was 150-180 for 4-year course but number dropped in 1965 because of introduction of new 5-year course.

3/ Total Lyallpur degrees for 1960-65 excludes 1960-61 because University was created in 1962.

1. Most extension officers felt they left college without sufficient practical crop production experience. This weakness is gradually being corrected, since the three teaching institutions are enlarging or improving their demonstration farms, and student periods devoted to farm practice have been lengthened. But still more emphasis is needed on "practicals".

2. None of the three institutions offers a satisfactory under-graduate course in agricultural extension methods. None has an assigned local area for extension teaching, approved by the Agriculture Department. Therefore most new employees of the extension service have never had any practice experience in extension, and must be given an apprenticeship after they enter employment. In Western agricultural colleges this apprenticeship is begun during school days.

3. Counselling services are now starting in each of the three teaching institutions, to advise students on their future employment. These counselling services convey the impression, for salary and other reasons, that extension is one of the least desirable jobs in agriculture. This image needs some corrective action.

All of these observations are no doubt over-generalized, but still very important. Future officers of the extension service must come from these schools. There are many other Government and private agencies competing to hire the better graduates including:

- Agricultural Development Corporation
- WAPDA
- Agricultural Development Bank
- Cooperative Department
- Irrigation Department
- Private concerns processing tobacco, cotton, sugar, rice, vegetable oil, etc.

It is important for the Directors of Agriculture to help these teaching institutions present the best possible image of the extension service, and to give the new graduates the kind of practical training needed in the extension service. To accomplish this, occasional lectures by extension officers to the faculty and students of these schools would be desirable. And some form of internship might be worked out for agriculture students, while still in school, to spend time in the field helping the local extension officers.

Moreover, by involving the University and the two colleges in the program of in-service training (described later in this report), the Agriculture Department could make the University and college faculties more conscious of the problems of the extension service, and the faculties would provide more realistic training for future agricultural graduates. Involving the University and two colleges in the training program could be done in two ways, both desirable:

- (i) The in-service training institutes, being located in the same communities with the University and the two colleges, could invite the faculties of the educational institutions to present guest lectures at the in-service training institutes. Many of the participants in these in-service courses would thus be listening to their former professors.
- (ii) Lyallpur University might be asked to organize every year a one week seminar for top officers of the Agriculture Department, from DDA's upward, in order to provide a more intimate relationship between the Department and the University. Since many of the senior officers are old boys of Lyallpur, such a seminar would have the atmosphere of homecoming week.

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The strained relations connected with the 1962 separation of Lyallpur University from the Agriculture Department, are rapidly disappearing, and it is now possible for the two organizations to share staff and facilities, and work out joint programs to a much greater degree than in the recent past.

- 4 -

9. Training Needs.

B. In need of a 2-year sub-professional course
in agriculture for high school graduates
to be employed as Agricultural Officers for
the extension service.

The Agriculture Department has under its immediate control the only five training institutes in West Pakistan which offer sub-professional training in agriculture to high school graduates, and award a certificate in agriculture. It is from these five schools that most new Field Assistants are recruited. The essential facts about these five sub-professional schools are summarized in Table 7 on the next page.

During the visit to these five training institutes, observed their physical plant, met their faculties, interviewed some of the present students, and noted a preliminary own judgment on their future usefulness to the Agriculture Department.

Approximately half of the graduates of these institutes during 1965-66 were hired by the Agriculture Department. Therefore the following general comments on these Institutes reflect directly on the quality of present sub-professional staff in the extension service.

Length of course The present one-year course was described as inadequate by everyone with whom I talked -- by the faculties, by the students, and by the Agricultural Officers who supervise the graduates. Experience in other countries shows that a 2-year course

Table 7

DATA ON FIVE AGRICULTURAL INSTITUTES OFFERING
SUB-PROFESSIONAL TRAINING TO MATRICULATES
(1964-65 POSITION)

Region	City	Length of Course	Hostel Capacity	Size of Faculty (Graduates)	Enrollment 1965-66	Approximate Output of Trainees 2nd Plan (1960-65)	Size of Demonstration Farms (Acres)
Peshawar (Northern)	Peshawar	11 months	200	5	100	603	12
Lahore (Central)	Lahore	11 months	150*	5	100	619	25
	F.Y.Khan	11 months	100	5	100	416	44
Hyderabad (Southern)	Akhrand	11 months	100	5	100	476	25
	Quetta	11 months	80	5	100	305**	25
					500	2419	

*This refers to new hostels to be ready in March 1966.

**The last batch finishing 11 months course in December 1965 is not included.

is the absolute minimum to produce a satisfactory sub-professional officer. East Pakistan shifted to a 2-year course 5 years ago, I am told. Some of the present difficulties of the Field Assistants in West Pakistan can be attributed to their inadequate basic training.

Quality of faculty: The average faculty of five degree-holders at each Institute is not sufficient in size to provide intensive practical field work for these young men. Very few of the faculty members have had more than one to three years experience in the extension service, and some had no extension experience at all. It will be necessary to strengthen these faculties both in size and in quality, if future sub-professional recruits to the extension service are to be of higher quality.

Quality of recruits: Except at Quetta I found that the institutes are drawing reasonably well qualified village boys for training. The problem at Quetta relates to the sparse population and the higher remuneration which boys can get from other lines of employment.

Training Methods: Each of the institutes has an attached farm for practical field training, but some recent graduates, with whom I talked in the extension service, observed that their lessons in the institutes had not been closely geared to the actual work they would be asked to perform after they entered Government service. Some of the institutes have begun to use an "internship system", whereby the student is required to spend Saturdays as an apprentice in the field with a more experienced extension officer. This system could be

broadened by creating an apprenticeship of several months each year, then return the boys to the Institute for a final discussion of what he has learned.

Physical plant: The quality of physical plant varies greatly between institutes. The institutes at Panrawar, Quetta, and Rafiz Yar Khan, are all former Village Aid Training Academies, with excellent buildings built about 1955-58, fairly well maintained, and with good demonstration farms. The Sargodha Institute has operated since 1962 in a derelict cavalry station, with boys sleeping in the former horse barns, and the classrooms improvised from buildings never intended as a school. This institute, fortunately, is receiving some new buildings in 1966. The Sakrand Institute is in deplorable condition. Its present buildings were originally built in the 1930's as the servants quarters to the old Sakrand Agricultural Experiment Station. Sakrand Institute does not even have a hall or classroom large enough for all students to meet at one place. This Institute deserves either a major reconstruction, or preferably, a move to Tardiana, so that it can share the stimulus of other agricultural teaching and research institutions.

In summary, the 5 Agricultural Training Institutes have been one of the neglected interests of the Agriculture Department during the Second Five Year Plan, and any proposal to strengthen the future extension service must include major attention to strengthening these schools.

Recommended changes during 1965-70

The Agriculture Department has already recommended that the sub-professional training course be lengthened to two years, and a Third Plan scheme is now under examination between the Agriculture and Planning Departments, providing for necessary enlargement of faculties, buildings, and equipment, commensurate with the lengthening of the course.

I strongly urge that this scheme, costing Rs.24 lakhs for the five years, be given official approval. But I wish, by a few comments below, to give my support to some features of the scheme which are necessary for success.

Faculty strengthening. The scheme increases the teaching faculties of the five institutes. It raises the position of Principal to Class I, thus making him inter-changeable with a DDA; adds a senior instructor in agriculture to each Institute, who may be an experienced EADA; and adds three other Class II officers. This re-grading of instruction staff should enable each of these institutes to acquire a few long-experienced extension officers who will train the newcomers to the profession. The increased numbers of staff also permit smaller classes, and more practical field work. The result should be that the new two-year graduates will be trained along lines that will equip them immediately to perform the duties of a Field Assistant.

Demonstration area for extension work. The new scheme permits the Agriculture Department to assign to each Institute a

Tehsil as an experiment. In order to give the sub professional training students are given actual experience in extension work with farmers, and the faculty of the Institute is also experiment with newer methods of extension. This is a very important feature of extension training in many foreign countries, including Japan and the Philippines, and should help to solve the feeling of the graduates that they had little actual training in extension work.

New syllabus. The last part of the new 2 year syllabus will come not from a foreign source but from your experienced Pakistani faculties. I expect to see a 2 year syllabus which had been hastily prepared last year by a committee of Institute principals. This syllabus still requires further study, especially to consider the special emphasis of the Third Plan on agriculture, and special cropping targets. I expect that the syllabus will be revised, together with a few modifications, and are the chief employers of the sub professional staff (the teachers), to review again the draft. Some flexibility is required to meet the climatic needs of the three regions.

Selection of students. The quality of men who enter these five institutes for training, to a large degree, the ultimate quality of your officers. I ask each regional director to consult with his principal principals or what steps can be taken to attract the ablest men to these Institutes. It is essential to insist that all students be drawn from the rural areas, not from the city, and that they pass matriculate training before entrance.

Internship assignments of students to work during vacation periods with experienced extension officers. The training institutes now provide one month vacation for their faculties, and the faculties need at least a few weeks' leave in which to prepare their new class courses. I recommend that these periods of faculty vacation and classroom preparation be used for the assignment of the students as interns to work with experienced extension officer in the field.

One such formula would consist of 11-1 10 1-1 months, covering a two year period, and being utilized as follows

- | | |
|-----------|--|
| 11 months | 1st year combination of classroom and supervised field work. |
| 1 month | - internship, working with an experienced extension officer. |
| 10 months | 2nd year combination of classroom and supervised field work. |
| 1 month | internship again with an experienced extension officer. |
| 1 month | Final seminar to discuss what the students have learned in their internship, to cover all points which the students feel were not adequately handled in the two year course, and to evaluate the training, both by students and faculty. |

Training sub-professionals for the private sector. Because West Pakistan has no other training centers for agricultural sub-professionals, a number of zamindars have been asking to send their sons to these training institutes, and even offer to pay all expenses of their sons. A number of private agricultural industries have also sought to employ the graduates of these Institutes, using them as buyer-agents or inspectors in tobacco factories, cotton ginneries,

vegetable oil presses, sugar mills, and other agricultural processing industry. This is a logical development. Most agricultural countries provide more jobs for agricultural sub-professionals in the private sector, than for agricultural graduates. This form of training is not available in West Pakistan, except at these institutes.

I recommend that in planning the intake of students for your Agricultural Institutes, you continue to make allowance for future estate managers and agents for agricultural industry, on a rising scale. The demand from the private sector will steadily increase during 1965-70.

Annual evaluation by your principals. The Secretary of Agriculture in Lahore could wisely call for a meeting of Institute Principals each year, at the end of the training course, to review the progress of sub-professional training in West Pakistan, and submit their findings to the Secretary. Each year there will be new developments worth identifying. Each year the Principals should be briefed on the progress of the Third Five Year Plan, and its production problems, so that the training of new sub-professional staff will always be in tune with the current needs of the Province.

In closing this section on sub-professional training, let me restate my faith in the importance of the Field Assistant. No army can fight a war only with generals, colonels, majors, captains, and lieutenants. Every army has found it needs sub-professionals -- the sergeants and the corporals, who support the higher officers in their immediate contact with the troops. That is the role of the sub-professional in agricultural extension also. If they are trained right and supervised right, they can be an essential element of West Pakistan's drive for bigger crops.

5. Training Needs:

C. Introducing three new In-Service Training Institutes, for retraining extension staff at all levels, in close collaboration with the Research Service

The Agriculture Department had an in-service training program at Lyallpur Agricultural College before 1962, but when the College became a university and was transferred to another Ministry, the regular in-service courses were dropped. Recently the Department has sent a few officers to such institutions as:

Pakistan Administrative Staff College
Academy for Rural Development, Peshawar
National Institutes of Public Administration,
Lahore and Karachi

These institutions make a contribution in the general field of public administration, but none offers technical retraining in agriculture.

The Department has given study leave to a few of its officers who hold B.Sc. degrees to return to the university for M.Sc. degree. But the number has not exceeded 10 a year.

Aside from this, the Department has maintained no institution, and only sporadic programs, for in-service training of agricultural officers.

No doubt this is the result of the great pressures upon senior officers, resulting from the very rapid expansion of agricultural staff during 1960-65.

A remedy to this situation is now an urgent need.

Proposals for in-service training during Third Plan. On my arrival in Pakistan (September 1965) I found the Agriculture Department had already decided to recommend an in-service program during 1965-70 for its own extensive personnel, along the following guidelines:

- (1) There should be a separate in-service training institute for each region, under supervision of the regional Director.
- (2) Training should be related as closely as possible to the Third Plan targets, and the findings of the Research Service. Therefore the new training Institutes should be located at, or in the same proximity, with the three major research stations -- Islamabad, Rawalpindi, and Tandojam. A specialized crop work is available only at Karachi Research Station (for wheat, rice and maize), and these will be covered by field trips.
- (3) Training is to be a continuous affair, like a university course, but a series of short courses will be run throughout the entire career of a technical officer. It is recommended that each officer should have two or three short periods of training during 1965-70, that at no one time should a longer course be taken than one year. The minimum length of retraining for a given technical level of officer during the Third Plan, and in one consecutive period, is:

Field assistants
Agricultural assistants
Cazetted officer	1 year

- (4) On-the-job application of training, under direction of the extension officer, is very important to get the full benefit of the training. The syllabi of the Training Institutes should include discussion of on-job follow-up, for all levels of officer.
- (5) In-service training should begin in 1965-66, with no new buildings the first year, but the program should expand to full scope in 1966-67, and aim to reach all extension officers with the full length of retraining listed in paragraph 3 above, during the Third Plan.

Within these guidelines I was asked to submit my recommendations for a sound training plan. I offer my observations below under the following headings, each of which I discussed at length with many agricultural officers.

- Location of Institutes
- Numbers to be trained, and facilities needed
- Curriculum for different officers
- Faculty
- Training of trainers
- Training starts at top and works downward
- The first trainees should be men who work together
- Buildings and equipment
- Expenditure of funds
- On-the-job training
- Annual evaluation
- Recommendations for in-service training

Location of Institutes

I fully support the decision to locate the in-service training institutes in close proximity to the three Research Institutes -- that is at Peshawar, Lyallpur, and Tandojam. This not only provides access to experimental fields, but enables the Training Institutes to draw supplementary faculty members from the Research Service, and the nearby educational institutions (Lyallpur Agricultural University, Peshawar and Tandojam Agricultural Colleges).

A strong faculty is the key to an effective training program.

Numbers to be trained, and facilities needed

The Planning Cell of the Agriculture Department calculated the staff to be trained, and the facilities required, as shown in Table 8 on the next page.

Table . Estimate of Numbers of Officers in Agriculture
Department Requiring In-Service Training and
Facilities required

	<u>Peshawar Region</u>	<u>Lahore Region</u>	<u>Southern Region</u>
Field Assistants in Position 1965	800	1600	800
Proposed size of training group	50	150	90
Maximum in one classroom	30	30	30
Classrooms needed for Field Assistants	2	5	3
Maximum size of field observation group	15	15	15
Agricultural Assistants in Position 1965 106		242	174
Size of training group	10-15	10-15	10-15
Gazetted Officers in Position 1965	67	124	25
Proposed size of training group	10-15	10-15	10-15
Total classrooms needed	4	9	5

Syllabi for different officers of in-service training

While travelling, I discussed the subjects to be included in the syllabi for the training of the different categories of extension staff. There was wide agreement on the following points:

For Field Assistants

1. Training should be of a practical character including handling of spraying equipment, tractors and tractor equipment and practical farm planning while visiting private farms.

2. Subjects neglected in previous training such as human relations, rural sociology, extension methods, program planning, and farm management, should have a place.

3. Field Assistants generally need more training in crop production methods, horticulture, and plant protection.

Extension methods have generally been neglected in past training for Field Assistants.

Farm management is a new and increasingly important subject in Pakistan. Technological change has started, which will keep our agriculture in a dynamic imbalance, characterized by a stream of new inputs, to which farmers must adjust. In this situation the extension staff will be called upon to help farmers with practical farm planning.

With farm mechanization in West Pakistan now involving thousands of new tubewells a year and hundreds of new tractors, it will be necessary for Field Assistants to answer numerous questions on mechanization.

Irrigation water management also deserves greater attention. Past water use practices were based on perennial shortage. The rapid expansion of tubewells requires the Field Assistant to understand the principles of optimum water uses.

For Agricultural Assistants

Main emphasis of training should be on:

- Program planning and evaluation
- Human relations and extension methods
- Agricultural economics and farm management
- Irrigation and water management
- Agricultural engineering (farm machinery and tubewells)
- Review of recent research results on crop production
- Five Year Plan

All college graduates should get lectures about the current Five Year Plan, and the strategy for agricultural development.

Under agricultural economics, in addition to farm management, lectures should be given in co-operatives, credit, land economics, agricultural marketing, and public agricultural policy, all subjects omitted by most under-graduates in their college studies, yet subjects on which questions constantly arise in extension work.

For EADA's and YMA's

Gazetted staff training will be of seminar type where they can discuss their experience, problems, and their views on the strategy of agricultural development. In addition, administration and supervision have an important place.

Since most topics affecting the higher staff will be of general character, they can profitably come together on a province-wide basis at one of the three in-service training institutes in rotation, so they get the opportunity to visit all the regions, all the research institutes, and all the institutions for graduate training.

Training the trainer staff for the 3 in-service institutes could possibly take place in the same way, rotating among the three regions.

Faculty

Each of the three regional institutes will require a faculty approximately as follows:

- Class I officer as Principal (interchangeable with DDA), also serving as instructor in administration and extension methods
- Class II officers, EADA or equivalent, to serve as instructors in:

- Farm Management
- Arboriculture and Water Use
- Plant Protection
- Horticulture
- Entomology
- Mechanization

As far as possible, each faculty member should be an officer with substantial past experience in the Agriculture Department, either from extension or research.

If the In-Service Training Institute is located on the grounds of a regional Research Institute, a question arises whether the Principal of the Training Institute should report to the Regional Director of Extension or of Research. There is no question in my mind that the Extension Service, which employs and controls the participants in this training course, must also employ the principal. But one of the reasons for locating the Training Institute at or near the Research Institute is to ensure the closest possible relationship between the two services.

Training of trainers

I urge that faculties of the three Institutes be trained in a single group, for a period of 2-3 weeks, in order to get the same fundamentals incorporated in the training throughout the province. This will not interfere with the introduction of different technical information in the three regions, to accommodate the climatic differences.

A combined training session for faculties might be attended by:

Secretary, Joint Secretary, and Deputy Secretary of Agriculture (part-time)
3 regional faculties, 21 men
Representatives of Research Service, Information Service, and Machinery Organization, when needed

Training the faculties can be accomplished on a seminar basis, each officer contributing from his own experience. Before arrival, each faculty member could be asked to answer three questions in writing:

- (i) What is my understanding of the primary role of the Director, the DDA, the DDA, the Agricultural Assistant, and the Field Assistant? How is supervision best achieved between these levels?
- (ii) How do I rate the effectiveness of the present extension methods? By what extension activities are new ideas best transferred to farmers?
- (iii) What are the inadequacies of the present system at each level?

The seminar discussion should proceed from the above basic information to the following more analytical problems:

- (iv) How can the extension service focus its efforts on the targets of the Third Five Year Plan in each region and district?
- (v) What extension methods are needed for the Third Plan, compared to the Second Plan? Focus on the concept of farmer-demonstrators, and farmer seminars.
- (vi) How can the extension staff best obtain recognition and support from the Union Council? Can the Union Council advise on farmer-demonstrators and farmer seminars? How can agricultural committees sponsored by the Union Councils help the Extension Service?
- (vii) Finally, what kind of on-job supervisor will best continue the learning process after the officer returns to his post?

Since the faculty seminar will be a closed meeting, the Secretary of Agriculture should instruct the participants to be frank in their criticisms of the past extension service, and imaginative in their approach to future change. (I know from my talks with extension officers there are many pent up feelings, many criticisms unexpressed, because the officers feel if they submit criticisms, they will be regarded as disloyal to the service. These criticisms should now be placed on the table, behind closed doors, before the retraining program is defined)

Start with the top officers and work downward

A training principle which is strongly recommended from experience in other services is "Start with your top officers and work down."


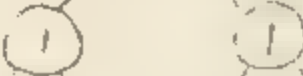
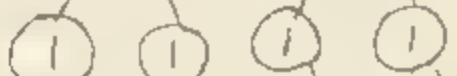

Your EAs must first consider their own problems, and how they relate to the EADAs.

Next the EADAs must be led through a training course, which identifies their problems and obtains their views on relationships to the subordinate officers. Next come the Agricultural Assistants and Field Assistants in that order.

Such a sequence gives proper recognition to the fact that supervision is one of the key problems in any extension service, and a proper subject for discussion in the West Pakistan service.

First participants should be men who work together

In order to learn as much as possible from the first training courses, I urge that you begin by training EADAs, Agricultural Assistants, and Field Assistants from the same District, who are related to each other in the chain-of-command, and therefore can apply, after their initial training, the on-job supervision which will be recommended below. Such a pattern of selection for participants might be as follows:

Type	Selection Pattern	Total	Notes
Deputy directors		11	All deputy directors for 3 regions
EADAs		20	Half of these in entire province
Agricultural assistants		40	Two from each EADA
Field assistants		80	Two from each AA

Buildings and equipment

Each of the three institutes will require buildings, either borrowed or new, to serve the following purposes:

Student hostel and dining hall
Faculty housing, and staff quarters
Classrooms
Office
Machine and animal sheds

The Planning Cell of the Agriculture Department is better equipped than I am to suggest your local practices in floor space and unit costs of construction.

Following the Governor's recent instruction to minimize new buildings under the Third Plan, I observed there may be opportunities to begin by borrowing hostel and classroom space at Peshawar (from Research Institute, Agricultural Institute and Peshawar Academy) and at Lyallpur (from Research Institute and the University) but at Tandojam it will be necessary to construct all facilities, since all institutions at Tandojam are overcrowded.

In planning the equipment for the Institutes, it would be necessary to include for each location:

Buses for field trips
Standard tractor and bullock implements, and tubewell equipment for teaching mechanization to Field Assistants
Standard plant protection equipment
Standard audio-visual equipment
Standard office equipment, including typewriters, and mimeograph machine

Much of this equipment has been offered to Pakistan under the Ford Foundation grant.

Experimental tehsil

In-service training institutes will each require an adjoining tehsil to serve as an experimental area for the faculty to try

out new methods, or conduct research on old methods, or to show off extension techniques to officers in training. It would be desirable if the extension officer in charge of the experimental tehsil could be a Gazetted Officer, and could work closely with the faculty of the Institute.

On the Job Follow-up

Each supervisor from the PDA down is responsible for on-the-job follow-up to apply what has been learned at the Institute.

If the three Regional Directors agree to the Third Plan extension strategy outlined in Chapter 4 of this report, on-the-job follow-up would mean the following sequence of events:

- (i) A meeting at Division level to set targets for the next crop season -- what crops to emphasize, what work plan.
- (ii) A training session for each district staff to be conducted by the EADA.
- (iii) Targets are set for number of farmer-demonstrators in each Union Council.
- (iv) Support is sought from each Union Council, under leadership of EADA and the Agricultural Assistants.
- (v) Farmer demonstrators are organized at the Union Council level under leadership of EADA and Agricultural Assistants.

At the end of the crop season, every EADA should be ready to present his conclusions on how the supervisory system is working, and how it might be improved. Training is an evolutionary process, and the supervisors in the field are the men who can make it more effective. It is their comments which should guide the province-wide training program during 1965-70.

Annual evaluation of in-service training

As with pre-service training, the Secretary of Agriculture might call for an annual progress report on the work of the in-service training institutes. Such a report could be prepared by an annual conference of the three principals, meeting at the end of the school year with a few key extension officers, who would review the methods and results of training, and recommend any needed changes to the Secretary.

My conclusions on in-service training

If in-service training is carried out during 1965-70 with proper management and follow-up, I am confident that this program will be one of the essential factors in achieving your production targets in the Third Plan. But this will be possible only if you keep to the basic principles:

1. Define your targets by choosing a limited number of crops, and a few improved extension methods. Don't scatter your efforts.
2. Confine training to subjects of immediate usefulness in production.
3. Make the training repetitive, year after year.
4. Use follow-up supervision as a further method of training.
5. Build a trainer staff who are themselves veterans in either the extension or research field. Give them special training abroad, by visits or study.
6. Keep the training under continuous evaluation. Improvements will emerge from experience.

5. Training Needs:

D. Introducing Farmer Seminars

New ideas always spread faster from one farmer to another, than from a Government officer to a farmer. More than 90% of what any ordinary farmer in a village has picked up in new ideas he learned from his more progressive neighbors.

Governments can use this principle. The farmer who adopts new ideas first in each village can be identified by the extension officer. In some extension systems he is called a "model farmer", in others a farmer-demonstrator.

These early adopters can attend a training seminar, organized by the Extension Service, where new scientific methods are presented, and the demonstrator is asked to try them, with special help from the extension service. The progress of the farmer-demonstrator is publicized. Field days are held to show off his superiority. Prizes are given for the highest yields. All these methods are designed to use the progressive farmer as an unpaid extension worker at village level.

A recent world-wide survey, of agricultural extension points out that schemes for farmer seminars are spreading rapidly in many countries, and have proved highly successful. (See UN-PAO survey, 1965, reprinted in excerpt as an attachment to this report).

Pakistan has been a leader in this experiment with farmer training. I cited the field days at West Pakistan model farms, and farmers' seminars sponsored by SCARP-1 and the West Pakistan Agri-

cultural Development Corporation. In East Pakistan, the Comilla and Mymensingh experiments with farmer training have attracted international attention.

The next step in West Pakistan is to adopt a province-wide system of farmer training which is low cost, closely related to the Third Plan, and within the competence of available extension staff.

Union Council Seminars

I recommend, as a start on this program, you select at least 10 farmer-demonstrators for each Union Council, or one from each village (about 35,000 for West Pakistan). This system of multiple demonstrations would replace the previous emphasis on Model Farms.

Farmer-demonstrators would be chosen by the EADA, in cooperation with his staff and the Union Council. The demonstrators would be invited to attend a training seminar of 3-5 days at the Union Council, or at a large private farm near Union Council Headquarters, before each planting season, at which the best scientific advice would be passed to them by a small staff of extension and research specialists. The farmers would return home each night. Cost would be slight. It might include:

- (i) Lunch for the farmers
- (ii) Some demonstration equipment
- (iii) Some audio-visual equipment

Some experimentation on farmer seminars would be needed the first year, and this could be directed by the In-Service Training Institutes, where the training materials and methods should be developed.

In the first year, the demonstration undertaken by each farmer-demonstrator need be only one or two acres but it would always include several alternate practices, the old and the new, side by side, to illustrate the advantages of the newer methods.

By the end of the first season, not only the demonstrator himself would be convinced of the wisdom of the new method, but some of his neighbors.

In the second year, the farmer-demonstrator would be helped by the Extension Service to recruit some of his neighbors, and train them in the same production methods.

In this manner, an energetic extension staff should be able to enlist every progressive farmer in West Pakistan in placing some demonstration plots before the end of the Third Plan in 1970.

Advanced farmer seminars at research stations

By the second year of the farmers' seminars, I would favor adding a more advanced type of course, which is frequently employed in countries like the United States. These advanced seminars would appropriately be held at Government research stations, or other Government farms where a staff of scientists is available to serve as faculty.

Advanced seminars should be restricted to those farmers who have already attended the Union Council seminar, have shown outstanding results in crop production, and are recognized as community leaders in better farming.

A group of not more than 30 such farmers could be invited to the appropriate research station, and given 3-5 days instruction under a much more senior scientific staff. For example, the 30 best producers of Mexican dwarf wheat might be invited at Government expense to a week's seminar at Ayub Research Institute, Lyallpur. The 30 best producers of fine rice might be invited to a similar seminar at Kala Shah Kaku or Dokri rice research stations. Similarly, the best corn farmers could be invited to the research stations at D.I. Khan or Yusufwala research stations. The only difference in the advanced seminar, compared to the Union Council level, would be that the advanced students are those who already proved they are outstanding producers, and the faculty would include some of the best scientists in West Pakistan, specializing in each crop.

Because of the shortness of the course, no special buildings need be considered, and no special faculty need be employed only for this training course. The same farmers should be invited to attend courses for both rabi and khari seasons.

Cost of the advanced seminars would be restricted to:

- (i) An honorarium for travel and living costs of the participants (say Rs.50 per man).
- (ii) Travel costs of Government officers brought from other research stations to give lectures.
- (iii) Demonstration and audio-visual equipment.

As experience is gained, and a wider number of farmers become demonstrators, it is possible that this system of farmer seminars could reach at least 60,000 men a year at the Union Council level, and several thousand in the advanced courses at the research stations.

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Thus, within the Third Plan, your 4,400 extension staff in West Pakistan might be multiplied 12 fold by the farmer-demonstrators who are helping to spread new scientific methods to their neighbors, without pay.

6. Conclusion: The Payoff from Stronger Extension
in the Agricultural Revolution of West Pakistan

West Pakistan aims to add almost Rs.300 crores per year to its gross annual agricultural production by 1970 - an increase from roughly Rs.900 to Rs.1200 crores per year during 1965-70 (using constant 1959-60 prices).

To help accomplish this, West Pakistan is now spending approximately Rs.2.6 crores per year on its agricultural extension services. These services can be made more effective, by better training, and new extension methods.

Therefore, changes have been proposed by the Agriculture Department for 1965-70, and reviewed in this report.

The Agriculture Department schemes to accomplish these changes are now estimated to cost during 1965-70:

For the 5 Agricultural Institutes ...	Rs. 24 lakhs
For in-service training and farmers' seminars	Rs. 96 lakhs
Total ...	Rs.120 lakhs (Rs.1.2 crores)

It is a very conservative conclusion that the extension proposals to achieve the Third Plan production targets could pay for themselves many times over, if carried out effectively.

These proposals have a direct bearing on the agricultural revolution in West Pakistan. The phrase 'agricultural revolution' is used here to mean the rapid introduction of new inputs such as more irrigation water, more fertilizer, new crops, new varieties,

new plant protection methods, new machinery, new cultivation practices, bringing a process of continuous change, all of which raise production per acre and make farming more profitable. These changes create the need for new scientific information, which an extension service helps to spread.

Those who study agricultural revolutions find that the rise in gross agricultural income never follows a straight line or curve, but resembles a diagram like a stairway:



The reason is that one new input, like tubewells, can cause a rapid upsurge of production, only to strike a plateau because some other input comes into short supply.

Such a plateau is likely to be reached during, or near the end of the Third Five Year Plan, when the easy agricultural gains from increased irrigation water and more fertilizer have been realized, but the more difficult problems of research on new crop varieties, and in introducing new production practices, has not kept pace.

That is the reason agricultural research and agricultural extension must not be allowed to lag behind during the major investments in water and fertilizer.

With modifications to the extension service, here discussed, I am confident the West Pakistan extension officers will be equipped to fulfill their role in sustaining the upswing of agricultural income throughout the Third Plan and beyond 1970.

C. A. Svinth

Attachment I

UN-FAO Report on World-wide Developments in Agricultural Research, Education, Extension, and Related Services, 1955-65

The following excerpt from a report published by the U.N. Food and Agricultural Organization relates to many of West Pakistan's problems and plans

The pages reprinted below appeared as Chapter IX of a book entitled The State of Food and Agriculture 1965: Review of the Second Postwar Decade. It was written by the F.A.O. secretariat, and published in Rome, July 1965.

The underlinings in the reprint below are added by the author to call attention to F.A.O. comments having special significance to the present report on West Pakistan

Chapter IX. Research, Education, Extension, and Related Services

AGRICULTURAL RESEARCH

Although statistical data are lacking, it is clear that facilities for agricultural research have expanded considerably during the past decade. But while the number of institutions and the personnel engaged in agricultural research have increased, the agricultural research institutes and experiment stations in almost all countries continue to suffer from shortages of funds, staff, and equipment.

Agricultural research is carried out in most countries by governments, by semipublic bodies such as commodity marketing boards, and by private enterprise. There has been increasing recognition of the need for close co-ordination among the various bodies undertaking agricultural research, through a national agricultural research

program in which each organization plays its part. But there has been less attention to the need for frequent contacts between research institutions and the bodies engaged in administering agricultural development, so as to ensure that research is directed toward what is most needed.

Many countries have come to recognize the advantages of making agricultural research the responsibility of the Ministry of Agriculture or an Agricultural Research Council. Such an arrangement generally makes it possible to ensure that a uniform research policy is maintained, that there is close liaison with the field and extension services applying the results of research, and that agricultural research done in universities and agricultural colleges is linked with work done in the ministry. There are generally many advantages in establishing a comprehensive research service or department to cover all disciplines (with the possible exception of veterinary, fishery and forestry research), instead of having a separate research unit in each division of the ministry. Several countries -- for example, Brazil, Cyprus, Ecuador, Ethiopia, and Libya -- have recently established or are establishing such a comprehensive research service.

Some countries have attempted to obtain better co-ordination of agricultural research with extension and training, by setting up stations covering all three subjects (as in Argentina) or co-ordinating committees (as in Tanzania). Much, however, remains to be done particularly in the co-ordination of research with farm management, extension, and planning and other economic aspects. In very few

countries are the results of agricultural research used as fully as they might be in the planning of agricultural development. Similarly, agricultural research is rarely directed specifically enough to the provision of the basic data needed for agricultural planning purposes.

During the past decade a number of countries have established high-level agricultural research councils as co-ordinating bodies for research, such as the one that has existed for many years in India. The Indian Agricultural Research Council was substantially reorganized in 1954, and similar bodies were set up in Sudan in 1957 and Pakistan in 1964. In Sudan the research council includes several foreign scientists of international repute. The purpose of these councils is to establish a policy and program for research in line with the long-term agricultural development needs of the country, co-ordinate research with work in associated fields, review past research, and ensure that each branch of research plays its allotted part in the general program.

In some developed countries, such agricultural research councils have been given considerable autonomy, in order to obtain greater flexibility and to minimize delays resulting from annual government budgets and bureaucratic procedures. Examples are Australia, Canada, New Zealand, the United Kingdom and the United States.

A feature of recent years has been the increasing interest in research projects in developing countries taken by research organizations in developed countries. This interest may take the

form of providing staff, equipment or funds, or the setting up of branch stations. For instance, research organizations in the Federal Republic of Germany and in Israel have supported and adopted research projects in various parts of Africa, following the system used by France for overseas research.

A few developing countries have concentrated their own research on the farmers' immediate problems and the requirements of the national development plan. This concentration on applied research has been made possible by the adaptation for local use of basic research results obtained by more developed countries in similar ecological zones and with similar cropping patterns.

The continuing shortage of qualified and experienced research workers has been a serious problem in developing countries. Many newly independent countries have lost most of their former staff of expatriate research workers. There is a grave danger, not only that research in these countries will suffer a severe setback, but that the results of previous research will be lost. Some countries have appreciated this situation and recalled some of their former expatriate research personnel to continue work until sufficient local personnel are trained. A few countries, such as Sudan, are making efforts to recover, and in some cases publish research results that are in danger of being lost in files and station records. In this way a great deal of unnecessary duplication of work and loss of time in the future can be avoided, and it would be advantageous if similar steps could be taken in other countries.

In most countries, especially in the developing regions, research into the economic and social aspects of agricultural development is still far from sufficient. Systematic programs of marketing research have been established in a few countries, for example, in India and Pakistan.

AGRICULTURAL EDUCATION AND TRAINING

During the last decade there has been increasing recognition that education and training has a crucial role to play in economic and social development. Education conferences organized by the United Nations Educational, Scientific and Cultural Organization (UNESCO) in the main developing regions have helped to focus attention on the vast needs for training in the developing countries. Education planning and manpower planning have emerged as important new disciplines, and pioneer studies have been made of the economic returns from intellectual investment.

Education and training are now generally recognized as a fundamental aspect of social and economic advancement in rural communities. This has led to a rapid expansion of institutions of agricultural education at all levels in most developing countries.

The organization of agricultural education varies widely from country to country, in respect of the authorities responsible for administration and finance, and of the manner in which the whole system of training is conceived and developed. In broad terms, however, the facilities in most countries fall into three categories: the university level for the training of

professional personnel for research and senior administrative positions in the agricultural services; the intermediate level to provide for the very large numbers of skilled technicians required in all branches of agriculture, including the extension services; and the vocational level at which young people are trained to enter farming and associated occupations, or practicing farmers helped to increase their efficiency.

As a result of FAO's Special Program for African Agricultural Education and Training, established in 1962, fuller information is available for Africa than for the other developing regions on the recent growth of facilities of agricultural education. In this region (excluding South Africa, as well as Libya, Sudan and the United Arab Republic which are included in FAO's Near East region) the number of universities with faculties of agriculture offering degree level courses rose from none in 1952 to 4 in 1955 and 17 in 1965. The annual outturn of agricultural graduates in the region rose from only 3 in 1955 to 249 in 1964.

There has been a comparable expansion at the intermediate level, and many new agricultural colleges or technical institutes have been established in Africa. In the training of farmers much emphasis was formerly given to farm schools for boys and young men who would, it was hoped, take up farming as a career and influence the more conservative farmers in their home areas. In general, this approach has met with little success. The numbers recruited have been small and the percentage of trainees who have eventually become established in farming quite insignificant.

This lack of success in training young men for farming has led to more emphasis on schemes for the training of farmers already in occupation of land and of others engaged in rural pursuits. This new approach to farmer training has met with marked success. The regular training of significant numbers of farmers, together with effective follow-up by the extension services, have made possible a real and sustained impact on farming development. In Kenya, for example, there were in 1955 10 small vocational training centers for training ex-school pupils in agriculture and animal health, with a total capacity of 290 pupils. By 1965 there were 33 centers for training in farming and related vocational subjects with a total capacity of 1,674, while during 1963 9,510 men and 4,294 women attended short courses.

In Latin America, the number of university faculties of agriculture rose from 34 in 1950 to 42 in 1955 and 54 in 1962; the annual number of students rose from 4,250 in 1950 to 6,707 in 1955, and of graduates from 748 to 1,113 during the same period.

As regards agricultural institutes or short courses in Latin America, there are no statistics to indicate the trend during the decade, but some information is available for 1962. In Bolivia, for example, there were technical or intermediate agricultural schools with about 450 students in 1962. In Chile in the same year, there were about 1,950 students in three-month courses and 160 in six-month courses at the institutes of rural education. There were about 40 schools of technical agriculture in Colombia with 2,873 students, and 41 adult training courses with 5,245 students. In

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Ecuador, there were four intermediate schools with an annual outturn of 15 to 20 students each, while in Paraguay five schools under the Ministry of Agriculture had about 200 students in nonuniversity courses and there were also three private agricultural schools at an intermediate level. In Venezuela, nine schools had a total of about 1,100 students and about 250 graduates per year.

In the Far East excluding China (Mainland), there were 74 agricultural colleges offering degree courses in 1959, of which 27 were in Japan, 20 in India, and 13 in the Republic of Korea. The only statistics of the outturn of graduates from these colleges are those published by UNESCO, which unfortunately do not appear to be comparable with those quoted earlier for Africa and Latin America. According to UNESCO, in China (Taiwan) the annual outturn of agricultural graduates rose from 541 in 1957 to 666 in 1960, in China (Mainland) from 10,000 in 1960 to 17,000 in 1960, in India from 2,525 in 1957 to 3,415 in 1959, in Japan from 6,000 in 1957 to 6,862 in 1960, in Pakistan from 375 in 1957 to 416 in 1960, and in the Philippines from 359 to 789 during the same period.

Diploma courses, intermediate between degree and vocational courses, are offered for the training either of government agricultural assistants (for example, in Burma, Ceylon, Malaysia and Pakistan) or of teachers for vocational schools (for example, in Thailand). In India, 116 training centers provide diploma courses for village level workers. In Japan, village level extension workers are trained at the prefectural agricultural experiment stations.

Vocational courses of two to four years' duration were offered in 1960 at over 800 secondary schools of agriculture in the Far East, of which about two thirds were in Japan. As in Africa, however, only a minority of the graduates returned to farming.

In the Near East, there are now 15 faculties of agriculture of which six are in the United Arab Republic, four in Iran, and one each in Afghanistan, Iraq, Lebanon, Sudan and Syria. Detailed information on the annual output of agricultural graduates is available for Sudan and the United Arab Republic, which are included under FAO's Special Program for African Agricultural Education and Training, referred to earlier. In Sudan, the output increased from 8 in 1955 to 27 in 1961, but fell back again to 5 in 1964. In the United Arab Republic it rose from 394 in 1955 to 1,511 in 1964. UNESCO data indicate that between 1957 and 1960 the output of agricultural graduates rose from 44 to 124 in Iraq, and from 223 to 505 in Turkey.

Facilities for intermediate and vocational agricultural education in the Near East also tend to be concentrated in the United Arab Republic. The number of higher agricultural institutes in the United Arab Republic increased from 3 in 1957 to 8 in 1963, and their enrollment from 270 to 7,160. Agricultural secondary schools increased from 16 in 1959 to 24 in 1963, their enrollment from 9,000 to 12,500 during the same period, and graduates from 2,300 in 1959 to 3,400 in 1963. There are also 32 agricultural preparatory schools, with 9,370 pupils, providing vocational training for agricultural workers.

The need for trained manpower in the developing countries has been so great that many of them have been obliged to avail themselves increasingly of facilities offered overseas, especially in Europe and North America, while they build up their own local training institutions. In agricultural faculties in some of the northwest European countries, for example, foreign students account for up to 15 percent of the enrollment. In many countries, such as the Federal Republic of Germany, there is special provision not only for foreign students but also for the training of people for work in the developing countries.

In the developed countries themselves, the number of students enrolled in agricultural faculties of universities has increased, in some cases very substantially. In Canada, for instance, in the two years between 1961/62 and 1963/64 undergraduate enrollment increased by 20 percent and postgraduate enrollment by 30 percent.

Even less information is available on the development of education in more specialized branches of agriculture. While facilities for veterinary education appear to have grown fairly rapidly, it seems that education in the various aspects of animal production continues to be neglected in many instances. Many agricultural faculties lack facilities for education in agricultural economics. In the field of agricultural marketing there is a need especially for practical training for the staff of marketing enterprises. Another neglected field in most developing countries is education in nutritional science for the personnel needed to staff government nutrition and home economics services.

General education

Agriculture still tends to be neglected in the primary and secondary schools of most of the developing countries. This is one of the principal causes, as a result, of the low regard in which agricultural work is held in these countries.

EXTENSION SERVICES

Agricultural extension services have been rapidly expanded during the past decade. In most of the developed countries they have long been in existence, but in the developing countries most of them date from the postwar period and a good many from the last decade.

In Japan, there were 12,115 field extension agents in 1959, or one for every 600 small farmers.

It seems probable that the expansion has also been rapid in the more recently established services of the developing countries, but there is very little systematic information. In very few developing countries does the number of field agents even approach the density of one for each 600 to 1,000 small farmers generally regarded as necessary for effective work.

Especially in the developing countries, the extension services continue to be handicapped by shortage of funds and of trained personnel. Extension work is further limited by lack of vehicles and transport, by the frequent need to work in difficult terrain, and by the fact that so many of the farmers with whom they are dealing are illiterate. Salaries of extension workers often remain too low to attract and retain suitably qualified personnel. Not only because of inadequate salaries but also because

of the low prestige of farming and the lack of amenities in the rural areas, there is a reluctance to work in the field with the farmers.

Scope and organization of extension services

In the earlier part of the postwar period there was still considerable disagreement about the concept and role of agricultural extension. It was often taken to cover the actual carrying out of services for farm people (rather than teaching them to do things for themselves) and also such activities as regulatory work. During the last decade, however, it has generally come to be recognized that the extension service should provide an out-of-school system of education, aimed at teaching farmers and their families how to improve their levels of living. Its association with regulatory duties has been found to hamper extension workers in their main functions by creating distrust of their intentions.

Home economics and rural youth work are now recognized as essential functions of the agricultural extension service. Rural youth organizations, assisted by the agricultural extension field workers, have been rapidly built up in many developing countries since the war. The development of home economics extension, however, has been relatively slow.

In many countries agricultural extension work is carried out by a number of different organizations, some governmental and some not. In some cases this has added to administrative difficulties, and also caused confusion among farmers. A unified agricultural extension service under the Ministry of Agriculture has therefore come increasingly to be preferred.

An important recent development has been the growing recognition of the role of the extension worker not only in the implementation but also in the formulation of agricultural development plans. In his capacity as a link between the farmer and the central government the extension worker can help to ensure that plans are realistic and that farmers' needs are fully taken into account.

But although there have been considerable advances in defining the concept and role of agricultural extension, the extension services in most countries are still far from measuring up to the standards that have been set for them. A recent survey of these services in 18 countries of east, central and southern Africa, for example, indicates that only four of them had unified extension services, and only nine carried out extension work with women while, in four countries, one half or more of the time of the extension agents was devoted to direct services and regulatory work.

In the extension services of developing countries there is still generally an inadequate number of subject matter specialists dealing with extension problems of specific crops or animals to back up the work of the field agents. Such specialists have an important part to play in the training of the field staff and also provide a useful link between the extension and research services.

Farm management and other economic aspects frequently tend to be neglected in agricultural extension work in developing countries. An encouraging development has been the introduction of systematic farm planning in some of these countries in recent years, although in most

cases this is confined to limited areas of the country. Agricultural marketing extension is another neglected aspect. The usefulness of such work has been demonstrated in Kenya, where field officers attended rural markets and advised farmers on grading and quality control, and in bargaining for fair prices. A marketing extension department has recently been established in India.

The lack of facilities for research and training in extension techniques is still a major obstacle in many countries. Systematic training and investigations in extension were begun in the United States before the war and there has been a substantial expansion in the postwar period. Training in extension education has started in Europe and Japan only since the war. In the last few years, however, a number of agricultural faculties in the developing countries have made provision for research and training in this new field.

The importance of in-service training for extension workers is increasingly recognized. During the last decade, in-service training has become a regular feature in Europe, North America and Latin America, and has also been started in many countries in other regions. This training now usually includes extension techniques as well as technical subject matter.

The need for the systematic evaluation of extension work, so as to increase its future effectiveness, is gradually being realized. Outside Europe and North America, however, such evaluation is carried out in India and Japan, but in very few other countries.

Extension methods

Because of the shortage of extension workers, especially in the developing countries, there is an increasing tendency to concentrate them in limited areas, for instance, on land reform projects and in pilot demonstration villages, rather than spread them thinly over the whole country. Examples are the so-called package programs launched in 1960 in India and Pakistan, under which not only extension work but all the other services and facilities needed for increased production are concentrated in selected areas of high potential.

Methods of training illiterate and semiliterate farmers have received much attention during the decade. The revival of systems of part-time training and short courses for farmers, especially in Africa, was discussed earlier, in the section on education.

A particularly interesting approach to agricultural extension is that being tried out experimentally at the Academy for Village Development, which was started in 1959 at Comilla, East Pakistan. Instead of sending extension workers to the villages, farmers elected to represent their villages are sent to the center for training. On returning to their villages, these newly-trained farmers pass on their knowledge to other villagers.

With the rapid spread of cheap transistor radios, many developing countries have been taking increasing interest in the use of radio for agricultural extension work. Particularly in

countries with a high rate of illiteracy and a shortage of extension workers, farm broadcasting can be a most useful medium for the provision of agricultural extension information to farmers.

DIRECT SERVICES TO FARMERS

Plant protection services

Quarantine enforcement has always been one of the main functions of a well-organized plant protection service. The increased international traffic in plant material in recent years has brought home to many countries the need to re-examine their quarantine legislation and to expand facilities to meet rising demands. There has generally been an expansion of staff and of facilities for the inspection and treatment of plants and plant products.

Another regulatory function which has been undertaken only recently is control of the marketing and use of pesticides. Following increased public concern at the possible harmful effects of pesticides, most governments have now established a system requiring proper labeling and precautions. In countries where there is legislation specifying residue tolerances, the plant protection authorities share with those concerned with the purity of food the responsibility for establishing tolerance limits.

In order to fill the gap between research and the practical aspects of plant protection, the plant protection services in many countries have undertaken an increasing amount of investigation and experimental work concerning pest control and quarantine enforcement. In addition, there has been a growing tendency for plant protection

services to undertake regular pest and disease surveys in order to follow closely the distribution and spread of pests and diseases of economic importance.

Many governments have not been content only to provide advice to farmers, but have increasingly undertaken the organization of pest control operations in order to gain quick results, for example, by mobile control forces, stationed at strategic points and provided with the necessary vehicles, equipment and supplies of pesticides. There are also certain cases in which control measures cannot be undertaken by individual farmers. For instance, to combat widely-distributed and fast-moving pests, efficient and timely measures have to be carried out over large areas. The ~~entire~~ campaigns have therefore always been a government task, either as part of a regional organization. In other instances, control measures, such as those involving the multiplication of parasites or other living agents and the use of radiation in insect sterilization, require resources and techniques that are beyond the capacity of individual farmers.

Extension has also always been one of the main functions of the government plant protection services. The need to provide farmers with timely information and competent advice on all aspects of plant protection is more important than ever, because of the number of pesticides available and the complexity of most modern pest control measures. The plant protection services are now able in many cases to forecast outbreaks and give the farmers precise instructions on the methods and timing of treatments required. A warning and forecasting system

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through radio broadcasts and other means has been organized in some countries. Pest control calendars have been established, incorporating spraying schedules and other information for controlling common diseases and pests of economic importance.

Attachment II

Pakistan's Third Five Year Plan, Agriculture Chapter, Sections on
Agricultural Extension and Education.

The following is an excerpt from Pakistan's Third Plan, edition of June 1965, pages 411-413.

Agricultural Extension

62. The vital role of extension services in disseminating knowledge among the farmers cannot be overemphasized. By and large, the achievement of targets for input utilization depends on the efforts of the extension workers. These services have improved considerably during the Second Plan period, both with regard to number and quality. Of particular importance in this respect has been the freeing of extension personnel from the time-consuming task of distributing agricultural supplies. Further improvements in performance are expected during the Third Plan, particularly with regard to additional training, the provision of transport, and other amenities.

63. In East Pakistan, a field staff for extension work already exists at all "administrative" levels. Emphasis during the Third Plan will therefore be on bettering their quality and providing additional facilities. To improve the existing condition, the following actions are recommended

- (a) that the Sub-Divisional Agricultural Officers, who are not agricultural graduates be replaced gradually by agricultural graduates.
- (b) that as many of the existing Thana Officers as is possible be replaced by agricultural graduates.

- (c) that since "front-line contact" with the farmers is at the Union level, a proper extension cell be built in each Union. This cell should provide living accommodations for the Union Assistant, a place for holding meetings of farmers, and the equipment needed for extension and demonstration purposes.

64. In West Pakistan, the Directorate of Agriculture at the Provincial level has been abolished and three Regional Directorates for Extension and three Regional Research Institutes have been established instead. Under each Director of extension there exists a field staff composed of Deputy Directors, Extra Assistant Directors, Agricultural Assistants and Field Assistants. The field assistants are agricultural school trained, while all those above them are at least agricultural graduates. The efficiency and effectiveness of this organization will be improved through the following programmes:

- (a) Whereas services of Field Assistants are available in most rural areas, there is practically no extension staff to meet the needs of agricultural belts surrounding urban areas. It is necessary, therefore, that one Field Assistant along with a complementary staff, be posted for the areas covered by each of the 400 Urban Union Committees.
- (b) At present, there is no central place where farmers can conveniently go to seek help and advice on agricultural matters. It is recommended that as many agricultural development cells at Union level as possible be constructed, with accommodations for staff, stores and a meeting place for farmers.
- (c) Side by side with the extension workers approaching the farmers in their villages, it would be useful if groups of farmers were brought in for short periods of instruction at farmer-training centres.

65. Extension personnel cannot be fully effective unless they are technically competent and are provided with the necessary facilities and equipment to help them in their work. Provision of such facilities

as transport, audio-visual aids, etc. must therefore also be considered as important goals for the Third Plan period. In addition, efforts must be made to further strengthen the recently established information service of the Agricultural Departments so as to develop attractive posters, pamphlets and other information media for use by the field staff.

66. In an attempt to bring about alround increase in agricultural production more quickly two important "experiments" were undertaken in East Pakistan during the Second Plan period. These have come to be known as the "Comilla approach" and the "Mymensingh approach." Neither of these projects has reached the end of experimentation. It is expected that many valuable lessons will be learned from both these experiments during the course of the Third Plan period. However, before an expansion of either of the approaches, answers to some vital questions - after thorough and penetrating evaluation in case of each - are necessary. For example, it will have to be determined as to which of the two approaches is more effective when measured in terms of increasing agricultural production, what are the costs involved in each approach, and what reorganization in the present extension system and administrative set up is required?

67. The effective transmission of knowledge, whether it is in the classroom or in the field, will play an important role in Pakistan's agricultural development. With this in mind, improvements in the agricultural education system during the Third Plan will place increased emphasis on improving communications between teacher and

student and between extension worker and farmer. Such a strategy will ensure that trained agriculturists possess the skills and techniques required for leadership in an agricultural sector of ever-increasing complexity.

Agricultural Education

68. An adequate supply of properly trained technical personnel is essential for the successful implementation of the Third Plan development programmes now envisaged for the Agricultural sector. Since training and education of technical personnel takes time, it is also essential that plans be prepared with an eye on the entire Perspective-Plan period.

69. Considerable improvements and expansion took place in agricultural education and training during the First and Second Plan periods. The most important achievement was the establishment of two agricultural universities - one in each Province. The West Pakistan Agricultural University has been built by elevating the former Agricultural College and Research Institute at Lyallpur, while the East Pakistan Agricultural University has been established from the former Animal Husbandry College at Mymensingh. At the other agricultural colleges, namely, Tandojam and Peshawar in West Pakistan, and in Tejgaon in East Pakistan, teaching facilities were improved and expanded to accommodate a larger number of students. As a result of this effort, student admission rose from approximately 400 in the first year of the Second Plan period to nearly 1,000 in the last year.

70. Keeping in view the future needs, the Third Plan provides both for expansion and improvement of all existing facilities, especially in the case of the Agricultural Universities. Of particular importance will be the effort to improve the quality and standard of agricultural education and training in various agricultural universities and colleges. In addition provision is made for a new agricultural college in East Pakistan. It is estimated that during the five years of the Third Plan, a total of about 3,750 agricultural graduates and post graduates will be produced, of these about 2,900 will be produced by the university and colleges of West Pakistan and the remainder by the Agricultural University Mymensingh and the Agricultural College, Talgaon of East Pakistan. In addition, around 30 "students" are expected to return each to East Pakistan and West Pakistan after getting their training and education abroad. Exact estimates of requirements of various categories of staff cannot be made at this stage. Rough estimates, however, indicate that while West Pakistan will about be able to meet its requirements of agricultural technical personnel, East Pakistan will most likely face a shortage.

71. In addition to graduate and post-graduate education, lower level education and training is equally important. Including some of the former Village AID training institutes, handed over to the Agricultural Departments in both the Provinces, there exist five training centers in West Pakistan and six agricultural schools and training institutes in East Pakistan. At present the Field Assistants training course in West Pakistan is a one-year course. In order to improve the quality of Field Assistants, the duration of their train-

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ing should be increased to two years. Similar changes in pre-service training may be needed in East Pakistan. Due to the emphasis on in-service training of extension personnel in both wings, it may be necessary to increase the frequency as well as duration of such in-service training. Also, some of the existing centres will be needed for farmers' training programmes. The Plan thus provides for improvement and expansion of existing arrangements, and also for the creation of new facilities.

72. During the Third Plan period particular attention will also be paid to improving the quality and standard of agricultural education and training in various agricultural universities, colleges, schools and training institutes. This will mean selection of competent personnel having an aptitude for teaching and research, training of local teachers abroad, and even importing well qualified teachers from outside universities.

Agronomic Research

73. The long-term development of Pakistan's agriculture will depend ultimately on the ability of researchers to adapt and invent techniques and technology relevant to Pakistan. Such research is of particular importance in the development of new high-yielding varieties, and priority will be given to this and other types of agronomic research work during the Third Plan.

74. Substantial progress was made in agronomic research during the Second Plan period. With regard to facilities, three agricultural research stations at Tarrab (Peshawar), Tandojam (Hyderabad) and Tejgaon (Dacca) were upgraded to full-fledged agri-

cultural research institutes; in addition, the Ayub Agricultural Institute has been set up at Resalewala, near Lyallpur. Results and proposed work mainly with regard to varietal improvements are summarized below.

75. Wheat: Two new varieties, C.566 and C.5747, have been evolved and are in their final stages of testing. These varieties have shown to have a high resistance to rust. The former is a strong stemmed plant which is capable of standing heavy doses of fertilizer and water. The latter variety is suited to the sub-montane regions and yields 3-4 maunds more per acre than present varieties. Both varieties are to be released for general cultivation during the Third Plan period. An Australian variety, Pirk, has proved suitable for the Peshawar region but still lacks high resistance to rust and smut, work on this variety will continue during the Plan Period. Two promising varieties, H.68 and T.J.558 are in the final stages of selection for the southern regions of West Pakistan. During the Third Plan work should continue on evolving higher yielding varieties especially with stiff stems which could stand the heavy use of fertilizers and those which are resistant particularly to rust and smut and on finding high yielding varieties for barani areas. The important material obtained from Mexico for the purpose will be utilized for direct experimentation and for cross breeding work.

76. Rice: research during the Second Plan developed an early variety of transplanted Amar rice (DA-31) for East Pakistan which gave substantially better performance than existing varieties. An other

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A.T. Aman variety (DA-29) was also evolved, which is suitable for medium-type saline soils. New varieties of fine rice were also tried with some encouraging results. In West Pakistan, an early maturing variety of fine rice, C-622 has been placed on the "approved" list of the Agriculture Department. Basmati 6129 is in the final stages of testing and has shown itself to be superior to the present variety. A cross-bred coarse rice has also been developed which is short statured and possesses high fertilizer response.

77. Varietal improvement efforts will be accelerated, especially in East Pakistan during the Third Plan period. More serious consideration must be given to using material and work developed in other parts of the world, especially at the International Rice Research Institute in the Philippines.

78. Cotton: Research work on cotton, an essential cash crop, continues to emphasize higher yields, longer staple length, and better ginning and spinning qualities. During the Second Plan period, AC-307, with a staple length of about 7/8 has been evolved, and is expected to replace several of the older varieties. In addition, improvements were made on Lasani 11 while 13/26 was released for cultivation. Research work, undertaken in East Pakistan to improve the Comilla variety of cotton, will be continued, and efforts will be made to evolve medium and long staple varieties. Further work is also being done to develop techniques for controlling root rot, boll rot and boll worm, and for determining best types and optimum doses of fertilizer.

79. Sugarcane: In West Pakistan, a high yielding non-lodging variety (CO-547) was evolved for the southern region. For the former Punjab and Bahawalpur areas, a superior variety (CO.L-54) was released for general cultivation and is rapidly being taken up by the growers. In East Pakistan, several Ishurdi varieties have been developed for release. Continued work is aimed at varieties with still higher yields and with greater resistance to pests and diseases.

80. Jute: Two new varieties, C-6 and C-4, have been found to be superior in yield and performance and were placed on the approved list. They are now being multiplied for distribution. Results of experiments on cultural practices showed that 10 to 12 per cent higher yields could be obtained by line sowing; a new seed multiplication technique in which the tops of plants are planted was also developed. Further work on early maturing, and flood and drought resistant varieties will be emphasized during the Third Plan period.

81. Fruits and Vegetables: The Second Plan witnessed a significant increase in the production of sub-tropical and citrus fruits. Banana cultivation has been introduced into West Pakistan and orange cultivation into East Pakistan. A number of new varieties of vegetables and fruits have been brought on the approved list. Among them potatoes, tomatoes, peas and lady-fingers, peaches, water-melon and musk-melon deserve special mention.

Plant Introduction

82. Introduction of new crops of commercial importance was encouraged during the Second Plan. On the basis of experimental

results, there appears to be good promise for cashewnut cultivation in both provinces; macadamia-nut and coffee plants are giving encouraging results in East Pakistan and several species of grasses and forage crops have been successfully introduced in the arid area of Quetta. The important work of plant introduction will be continued and further encouraged during the Third Plan period as it can in the long run, help to diversify agricultural production in the country.

Arid Zone Research

83. Agronomical research under barani conditions has been going on in West Pakistan near Rawalpindi during the Second Plan period. In order to cover all the important aspects of arid zone research a full-fledged research station will be established under the Third Plan with a comprehensive research programme covering all inter-related fields.

Soil Surveys

84. The First Five-Year Plan recommended the formation of a uniform system for soil classification, a soil-survey of the entire country on systematic lines by a single agency, and the preparation of soil maps for general use. On the basis of these recommendations, a project for conducting reconnaissance soil surveys in the country and the printing of maps for general use was developed by the Food and Agriculture Council and approved by the Government in 1960. It took some time before the initial troubles of staffing were overcome, but by middle of 1964, trial reconnaissance survey work had been completed. It is expected that by the end of the Second Plan period, an area of

2.3 million acres in East Pakistan, and 7.7 million acres in West Pakistan will have been mapped.

85. This project will continue during the Third Plan with the ultimate aim of making an inventory of all the soil resources of the country. Use will be made of aerial photographs which are already available for most parts of the country. It is expected that by the end of the Third Plan period, the whole of East Pakistan, and over two-thirds of West Pakistan will have been mapped. Such information will provide a much better base for planning the conservation of soil and water resources, and for developing irrigation and reclamation projects.

86. During the First Plan also, a "Rapid Soil Fertility Survey" was started in both Provinces to classify existing soils in terms of their fertility levels, and to examine the extent to which fertilizers could improve yields. Fertilizer trials were laid out on farmer's fields to ensure their participation and confidence and to provide recommendations that could be directly relevant for farm operations. This programme was expanded during the Second Plan, and over 10,000 trials have been carried out. It has been found, for example, that in both Provinces, the combined applications of nitrogen and phosphorous give much higher increases than when these elements are used separately.

87. During the Third Plan, this useful work will be further expanded to include a larger number of trials with different varieties, different fertilizer doses, and different moisture conditions. Study will also begin on the benefits to be obtained from the application of trace elements.

AGRICULTURAL ECONOMICS

Farm Management

88. Given the predominance of agriculture in Pakistan, information on farm management is of paramount importance as a basis for public policy and for helping farmers in their decision-making processes. During the Second Plan studies on all Pakistan basis were developed by the Central Ministry of Agriculture. Fourteen survey areas - 8 in West Pakistan and 6 in East Pakistan - were established. These farm management studies attempted to discover, how with a given set of resources farm incomes could be maximized, which farm practices could yield the most economical results and which factors caused variation in incomes on similar types of farms of the country. The ultimate objective has been to develop farm plans as models for efficient farming under a given set of conditions. A national farm management centre was also organized in 1962 by the then Directorate of Agricultural Economics and Statistics, Ministry of Agriculture, to deliberate on the problems and to improve the techniques of farm management. In addition to its substantive contributions, this centre also trained local staff engaged in farm management studies. During the Third Plan period, the scope on these studies will be expanded to include study of managerial processes and to increase the number of projects in each Province.

89. The Central Ministry of Agriculture has also started a series of economic studies in agriculture. During the Second Plan, reports were published on cropping patterns and intensities, seed

requirements, utilization of agricultural commodities and the use of fertilizers. Work is currently underway on factors affecting cotton production, farm mechanization, agricultural prices and fertilizer consumption. Further expansion of these surveys during the Third Plan will include studies on the effects of tenure and type of irrigation on productivity, the economics of milk production and the economics of plant protection.

90. Formerly there was a full-fledged Department of Agricultural Economics and Statistics, under the Ministry of Agriculture and Works, which has now been amalgamated with the Cooperation and Marketing Department and renamed the Department of Marketing Intelligence and Agricultural Statistics. As a result of this integration, the importance of agricultural economics research has been adversely affected. In order to improve the situation, a Bureau of Agricultural Economics and Statistics will be established during the Third Plan period. It will be the function of this Bureau to ensure that the surveys and research in agricultural economics, so urgently needed for agricultural development planning, are effectively and efficiently carried out. The Bureau will also impart necessary training in agricultural planning techniques and methodology to the personnel directly or indirectly concerned with planning and development of agriculture.

